MATERIALS BUREAU

MATERIALS METHOD 5

PLANT INSPECTOR'S MANUAL FOR BITUMINOUS CONCRETE MIX PRODUCTION

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NEW YORK STATE DEPARTMENT OF TRANSPORTATION
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NEW YORK STATE DEPARTMENT OF TRANSPORTATION MATERIALS BUREAU ALBANY, NY 12232 **MATERIALS METHOD**	MATERIALS METHOD: NY 5.0 ISSUE DATE: MARCH, 1987 Supersedes: MM NY 5.0, DATED APRIL, 1967

SUBJECT:

PLANT INSPECTOR'S MANUAL FOR BITUMINOUS CONCRETE MIX PRODUCTION

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SCOPE

The purpose of this Materials Method is to describe Department practices involved in the plant inspection of bituminous concrete mixtures. Full compliance with this method will provide uniform inspection procedures at the plant, thus minimizing the risk to the Producer, Contractor and the Department of placing substandard material in the work. A secondary purpose is to determine the quantity of mixture produced and authorized to be shipped to each project.

PREFACE

The inspection procedures outlined herein are, in fact, inspection procedures conducted on behalf of the purchaser (the Department) and are in no way to be construed as an assumption of responsibility by the Department for the production of acceptable material. Regardless of the depth of inspection or the details thereof, it remains the responsibility of the Contractor to furnish all material in compliance with the Specifications. The quantity of bituminous concrete mixture authorized by the Plant Inspector to be shipped to the project is based on the Producer's compliance with the specification requirements for the production of the mixture. If the Plant Inspector determines that the Producer is not in compliance with the specification requirements, the Plant Inspector will order the Producer to cease production operations until corrections are completed.

Although the inspection procedures detailed herein may appear quite comprehensive, they are limited to sampling rates practical during routine production for accomplishment by one individual and it is therefore possible, although not probable, for deliveries of segregated, contaminated or otherwise substandard material to be made to the project. In such event, it is the responsibility of the Project Engineer to reject the substandard material whenever such occurrences are apparent. It is also the responsibility of the Project Engineer to be certain of the placement temperature.

A Plant Inspector may suggest methods for improvement of plant operations but he will not authorize shipment of substandard material pending correction of the conditions which produced it; nor do such suggestions by the Plant Inspector bind the Department in the event that the application of a Plant Inspector's recommendation did not have the expected result.

The testing frequencies outlined in this method are for routine production and should be followed as closely as possible. There may be times when the production rate of the plant does not warrant routine inspection, therefore any miscellaneous production may be inspected and tested in a manner determined by the Regional Materials Engineer. Also, there may occasionally be instances in which a recorded weight may deviate slightly from the allowable tolerance limits for production, and it is not evident until a subsequent review of the recordation by the Plant Inspector. This occasional batch may be authorized if in the judgement of the Regional Materials Engineer no detrimental effects to the mix have been introduced and the material is in reasonably close conformity with the specifications. Additionally, it is recognized that in certain situations the Plant Inspector must emphasize one test and/or inspection procedure to the detriment of others in order to assure correction of extreme plant deficiencies. Therefore, so long as the Regional Materials Engineer is kept informed and the situation is noted in a diary, the Plant Inspector may deviate at times from strict conformance to these testing frequencies.

Materials Method 5 consists of four (4) Sections and Appendices. Sections 1 through 3 contain procedures that the Plant Inspector should use while inspecting and documenting the production of bituminous concrete. Section 4 describes the inspection and approval procedures performed normally by either the Regional Materials Engineer and his staff or by representatives of the Materials Bureau as indicated.

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SECTION 1

INTRODUCTION

1-1 GENERAL

All bituminous concrete mixtures shall be proportioned according to job mix formulae prepared by the Producer and approved by the Department. All materials used shall be approved by the Department prior to use.

All bituminous concrete intended for use on Department projects shall be produced in plants approved by the Department. A bituminous concrete plant is an assembly of mechanical and electronic equipment where aggregates are blended, heated, dried and mixed with asphalt to produce a hot bituminous mix meeting specified requirements. In general, plants can be categorized as either 1.) a batch plant [Figure 1-1] or 2.) a drum mix plant [Figure 1-2].

Regardless of the plant type, the basic purpose is the same, which is to produce a hot mixture containing the proper proportions of asphalt cement and aggregates at the specified temperature. Both types of plants, batch plants and drum mix plants, are designed to accomplish this purpose. The difference between the two plant types is that batch plants dry and heat the aggregate, then re-screen and size the aggregate into separate hot holding bins from which the various aggregate sizes are proportioned and mixed with asphalt cement one batch at a time; drum mix plants dry the aggregate and blend it with asphalt cement in a continuous process and in the same piece of equipment. The Plant Inspector's responsibilities vary to some degree depending on the plant type. These differences will be described later.

Bituminous concrete production is normally under the inspection of a Resident Plant Inspector assigned by the Regional Materials Engineer. When resident plant inspection is not feasible, small quantities of bituminous concrete may be accepted based upon the Producer's certification that the bituminous concrete meets all specifications.

The bituminous concrete shall be delivered to the project site in haul units approved by the Department.

1-2 INSPECTION PROGRAM

The Department uses an inspection program during the production of bituminous concrete to assure acceptable material. This minimizes the risk to the Producer, the Department and the Contractor of placing substandard material into the work. A secondary purpose is to provide proper documentation of the material as it leaves the plant.

Although the inspection procedures are comprehensive, they are limited to practical accomplishment by one individual. However, it is recognized that in certain situations a particular test/inspection procedure must be emphasized to the detriment of others in order to assure correction of extreme plant deficiencies. When this happens, the Plant Inspector may deviate from strict conformance to this test and inspection procedures provided that such situations are noted in his diary.

It is possible, although not probable, for deliveries of substandard material to be made to the project. In such event, it is the responsibility of the Project Engineer to reject the substandard material whenever such incidents are apparent. It is also the responsibility of the Project Engineer to be certain of placement temperatures.

It should be noted that the inspection procedures contained in this Materials Method are conducted on behalf of the purchaser (the Department) and are in no way to be construed as an assumption of responsibility by the Department for the production of acceptable material. Regardless of the content or extent of inspection, it still remains the responsibility of the Contractor to furnish bituminous concrete in compliance with the specification.

1-3 PLANT INSPECTOR'S RESPONSIBILITY

The Plant Inspector is a key member of the team that assures the production of a quality mix. The primary inspection function is to observe plant operation and to sample materials to determine specification compliance. The Plant Inspector must know both "how" and "why" the work is to be done. The Plant Inspector should be aware of all that is going on and bring to the attention of the plant supervisor any detected problems or potential problems. However, a Plant Inspector should never assume responsibility for the production of a mix such as adjusting plant controls or setting dials, gauges or meters.

It is important that the Plant Inspector maintain an attitude of cooperation and helpfulness, while being firm but fair in making decisions and remaining faithful to his responsibilities.

The Plant Inspector's responsibility is limited to inspection of operations at the plant. Once the haul unit leaves the plant site, the Project Engineer assumes responsibility of inspecting operations from there on.

In general the duties of a Plant Inspector include:

1. Assuring that only approved materials are incorporated in the mixes.

2. Inspecting plant production to assure that mixes comply with the approved job mix formulas.

3. Monitoring and inspecting plant equipment and operations to assure proper heating and drying aggregate, asphalt temperature, proportioning of materials, and production of a hot mix bituminous concrete within specification.

4. Sampling asphalt, aggregate and mixes for laboratory analysis.

5. Maintaining a diary, test records, production records and issuing shipment authorizations to projects.

6. Practicing plant safety procedures, being constantly on the alert for any hazardous conditions or practices, and bringing such conditions or practices to the attention of the Regional Materials Engineer.

1-4 INFORMATION SOURCES

A Plant Inspector, in order to be effective, must be aware of all the pertinent criteria related to his work. The following is a list of various sources of information in addition to this method, that may be used as references.

SOURCE	INFORMATION
Specification Book (including all addenda)	Material Requirements; Mixing Plant Requirements; Holding Bin Requirements; Handling, Measuring and Mixing Materials; Haul Unit Requirements
Approved Material and Equipment List	Release compounds for Asphalt Mixes; Bituminous Material Primary Sources
Sources of Fine and Coarse Aggregate Listing	Aggregate Source Numbers; Aggregate Type; High Friction Acceptability
Materials Method 5.13	Marshall Mix Design Method for Asphalt Concrete Mixture
Materials Method 5.14	Recycled Hot-Mix Bituminous Concrete Mix Design
Materials Method 7.1	Source Approval and Shipment Procedures for Coarse and Fine Aggregate
Materials Method 8.1	Quality Assurance Procedure for Paving Grade Asphalt Cement - Quality Assurance
Materials Method 18.3	Aggregate Sample and Acceptance Transmittal
Materials Method 27	Plant Equipment Inspection Manual

PLANT INSPECTOR'S CHECKLIST

1. Do you understand your responsibilities?
2. Do you have the required sources of information?

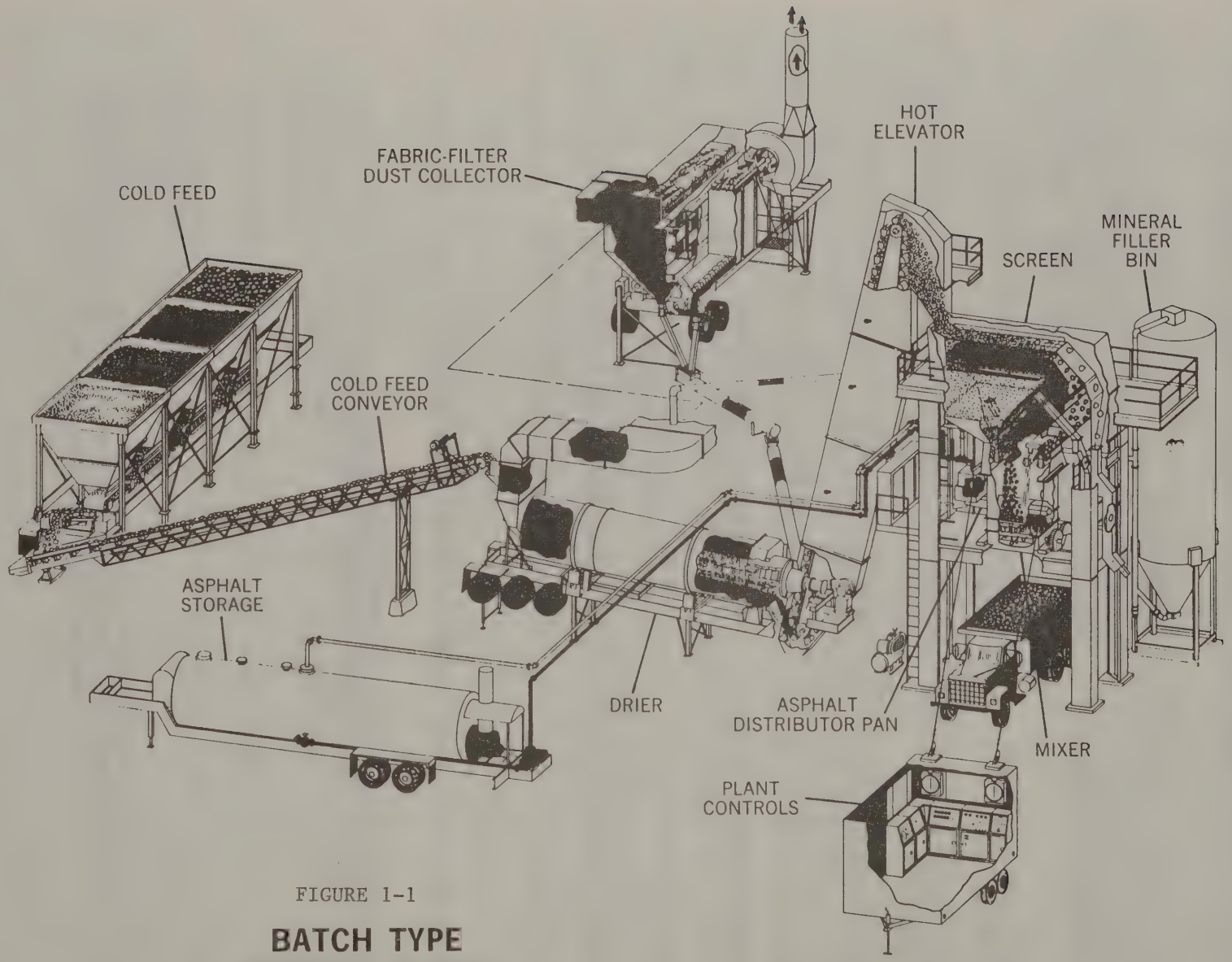


FIGURE 1-1

BATCH TYPE
ASPHALT PLANT

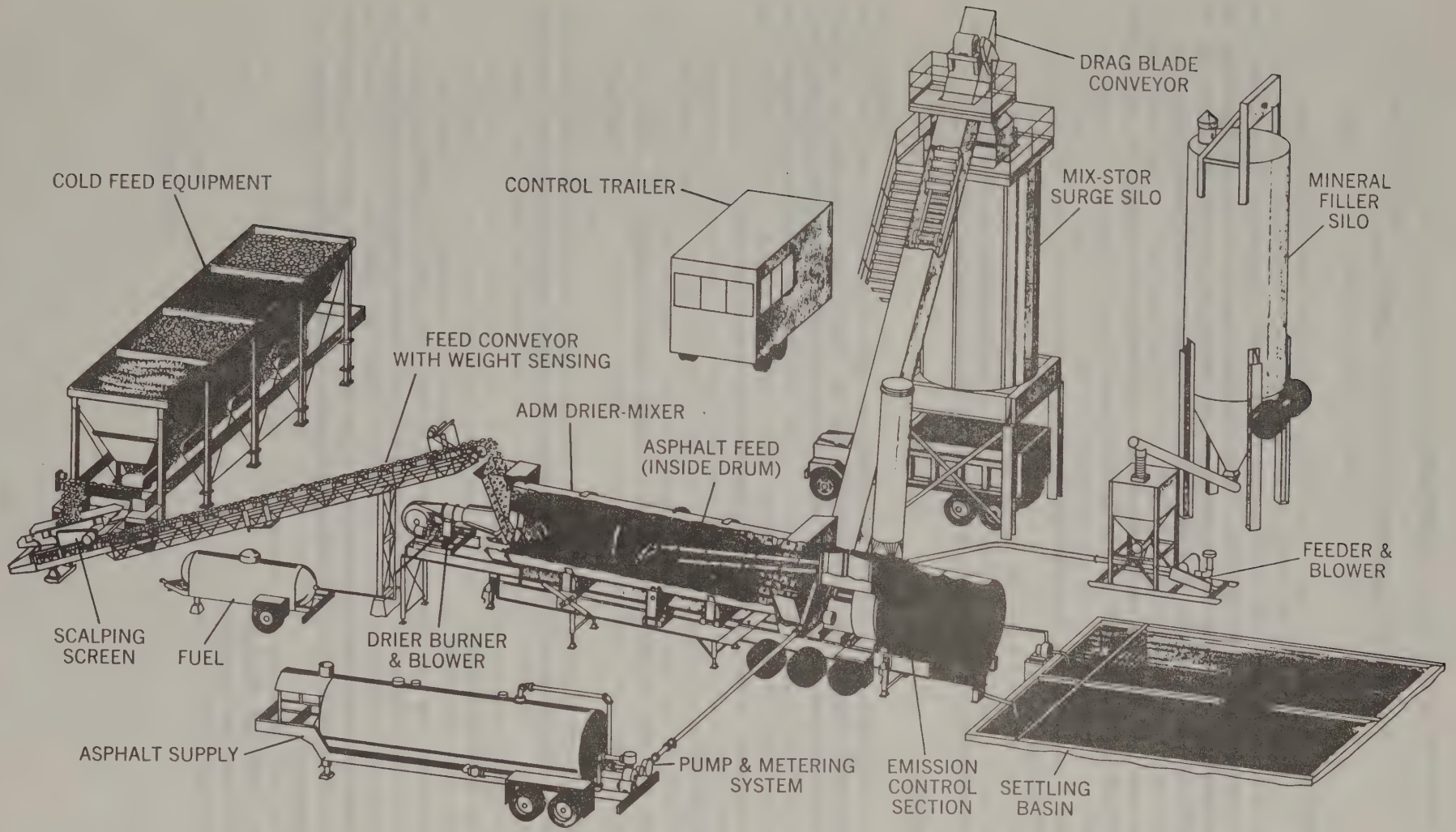


FIGURE 1-2

ASPHALT DRUM MIX PLANT

SECTION 2

BITUMINOUS CONCRETE PRODUCTION INSPECTION

2-1 GENERAL

This section describes the procedures that the Plant Inspector shall use for inspecting, testing, and controlling the proportioning, mixing and holding of bituminous concrete. Inspection procedures relating to equipment approval by the Regional Materials Engineer or his representative are outlined in Section 4.

The Plant Inspector should be aware that the following information is necessary prior to any State production from the plant.

1. Annual plant approval with noted limitations.
2. Job Mix Formulas (JMF).
3. Explanation of symbols used for recordation purposes.
4. Aggregate certifications (If required by Region in addition to JMF.)
5. Bituminous material certification, Form BR-162, or equivalent.

2-1.10 MATERIALS

The quality of bituminous concrete produced can only be as good as that of the materials going into the plant. Therefore, one of the Plant Inspector's primary duties is to assure that an adequate supply of suitable materials is available prior to and during plant operations. The following sections discuss the handling and control of both aggregate and asphalt cement. The principles presented are common to all types of bituminous concrete plants.

2-1.11 AGGREGATES

Aggregate used in the production of bituminous concrete shall be approved for quality prior to use.

When reclaimed asphalt pavement (RAP) is to be used as an aggregate the material shall conform to the Standard Specifications Section 703-09 - Reclaimed Asphalt Pavement.

A. Evidence of Acceptability

Each bituminous concrete producer shall submit to the Department prior to production a certification indicating that both coarse and fine aggregate to be incorporated into the work are from approved sources. It shall be prepared and signed by a representative of the bituminous concrete producer and it shall contain the following minimum information for all coarse and fine aggregate:

1. Source Name and Number
2. NYSDOT Size Designation

A new certification submission is required annually or whenever any of the following occur:

1. When a different aggregate source is used.

2. When additional aggregate sizes are introduced that have not already been included in the previous certification for the year.

In addition to source certification, it may be necessary to require a delivery ticket to identify aggregates arriving at the plant site. Those bituminous concrete producers, receiving aggregate from more than one source, may at the option of the Regional Materials Engineer be required to provide a delivery ticket with each shipment of incoming aggregates. This ticket or a legible copy shall be kept on file by the bituminous concrete producer and available for inspection by the Department. When used, the delivery ticket shall contain the following information:

1. Source Name and Number.
2. NYSDOT Size Designation.
3. Name and location of supplier if different from the aggregate source.
4. Quantity.

B. Aggregate Stockpiles

It is the responsibility of the Plant Inspector to see that aggregates are stored and handled in a manner which minimizes degradation and segregation and avoids contamination.

Department approved aggregates shall be stockpiled separately from non-approved aggregates on bases having adequate drainage and approved by the Regional Materials Engineer. The stockpiles shall be made so that aggregate of different sizes and from different sources are separated and contamination from adjacent stockpiles is not possible. The Regional Materials Engineer may require that the stockpiles be clearly marked for identification.

The Plant Inspector shall inspect the stockpiles and the methods used to transport the aggregates to the cold feed daily. If segregation or degradation is noticed, he shall report this to the Producer. If these conditions are not corrected, the Plant Inspector shall increase the frequency of gradation tests and notify the Regional Materials Engineer.

C. Aggregate Sampling

During the process of producing, stockpiling, and handling aggregates, good quality assurance procedures require tests to:

- Assure that only acceptable aggregates are used in the paving mixture, and

- Provide a permanent record as evidence that the aggregates meet job specifications.

Obviously, it is not practical to test all the aggregate being produced or to test the entire contents of a stockpile. It is feasible only to test samples of these aggregates. For test results to be accurate the most important consideration in sampling is to be certain that the sample represents of the entire portion from which the sample is taken. Proper sampling techniques are, therefore, very important. Aggregates are sampled in various locations and ways depending upon the type of plant and plant operations. Sample locations and details are explained in Appendix A - Sampling of Aggregates.

1. High Friction Aggregate Sampling - All mainline pavement surface courses are required to have high friction coarse aggregates. Coarse aggregate sampling frequencies are listed on the pertinent job mix formula. It is the Plant Inspector's responsibility to enforce the use of the coarse aggregates as identified on the job mix formula and to sample coarse aggregate in order to document aggregate source use and non-carbonate percentages. High friction sampling details are outlined in Appendix F - High Friction Aggregate Determination.

   The Producer uses one of two methods for producing bituminous concrete in compliance with the specifications for high friction surface course mixes. The mixes are manufactured at the mixing plant using either:

   a. All coarse aggregates from approved high friction sources.

   b. Non-carbonate coarse aggregate particles blended with low friction carbonate aggregates at the bituminous concrete mixing plant.

   In addition to aggregate gradation and asphalt cement contents, the Producer identifies the aggregate source when submitting job mix formulas. All coarse aggregates specified on the job mix formula are from sources that are approved by the Department as high friction aggregates except those aggregates which are upgraded by adding non-carbonate particles at the mixing plant.

   As part of the job mix formula approval procedures, the Materials Bureau establishes an aggregate sampling frequency and states the frequency on the job mix formula. Details on aggregate sampling are in Appendix F - High Friction Aggregate Determination.

   The acceptance procedures for the two (2) methods of producing high friction mixes are illustrated by Figures 2-1 and 2-2.

   Evidence of Acceptability - The procedures described in Section 2-1.11.A of this method shall apply.

   Aggregate Supply - The Plant Inspector shall determine that the Producer has a sufficient supply of approved aggregates for the production of high friction surface course mixes. When non-carbonate particles are blended with carbonate aggregates at the bituminous concrete mixing plant, the Plant Inspector shall observe the stockpiles to assure that the non-carbonate blending aggregates are stockpiled separately and not contaminated with other aggregates. Aggregates stockpiled over a tunnel cold feed system shall be evaluated by the Regional Materials Engineer to determine if the stockpiles need to be separated by partitions.

MIXES HAVING AGGREGATES FROM
APPROVED HIGH FRICTION SOURCES

RESPONSIBILITY	ACTION
BITUMINOUS CONCRETE PRODUCER	Submits job mix formula (JMF) to Regional Director specifying coarse and fine aggregate sources.
REGIONAL DIRECTOR	Reviews, recommends approval, forwards JMF to Materials Bureau.
MATERIALS BUREAU	Approves JMF, establishes aggregate sampling frequency, and returns JMF to Region.
PLANT INSPECTOR	1. Verifies certification of aggregate shipments against job mix formula. 2. Visually spot checks the cold feed to assure that proper aggregates are used for high friction mixes. 3. Samples aggregates as indicated in Appendix A and forwards to the Materials Bureau.
MATERIALS BUREAU	Test aggregate samples and returns results to Region.

FIGURE 2-1

MIXES HAVING NON-CARBONATE PARTICLES BLENDED
WITH LOW FRICTION CARBONATE AGGREGATES AT
THE BITUMINOUS CONCRETE MIXING PLANT

RESPONSIBILITY	ACTION
BITUMINOUS CONCRETE PRODUCER	Submits job mix formula (JMF) to Regional Director specifying coarse and fine aggregate sources. Also specifies non-carbonate blending procedures and the proportions of added non-carbonate.
REGIONAL DIRECTOR	Reviews JMF, recommends approval and forwards to Materials Bureau.
MATERIALS BUREAU	Approves JMF, establishes sampling frequency, and returns JMF to Region.
PLANT INSPECTOR	1. Verifies certification of aggregate shipments against JMF. 2. Visually spot checks the cold feed to assure that the acceptable aggregates, in the approximate proper proportions are used for high friction mixes. 3. Samples aggregates as indicated in Appendix A and forwards to the Materials Bureau.
MATERIALS BUREAU	Test aggregate samples and returns results to Region.

FIGURE 2-2

2. Mix Production - The high friction wearing surface courses shall be produced according to the NYSDOT Specifications Section 401 and as outlined in the succeeding paragraphs.

   Mixes using Aggregates from Approved High Friction Sources - The Plant Plant Inspector shall visually spot check the cold feed to assure that the aggregates specified on the approved job mix formula are incorporated into the mix during the production of high friction surface course mixes. If the aggregates appear to be different than those specified, the Plant Inspector shall notify the Producer and the Regional Materials Engineer.

   Mixes having Non-Carbonate Particles blended with Low Friction Carbonate Aggregates at the Bituminous Concrete Plant - All aggregate blending methods used at the bituminous concrete mixing plants shall provide assurance for mix uniformity and correct proportioning. The non-carbonate particles shall be proportioned and blended by a separate cold feed bin for each size of added non-carbonate particles. Any other method or methods must be approved by the Materials Bureau. The method or methods approved for use by any plant are described on the Job Mix Formula.

   When cold feed bins are used to blend the non-carbonate particles, the separate bin and cold feed bin device shall be used only for non-carbonate material during the production of the high friction mixes. Alternate layers of aggregates or bin divisions will not be allowed. Aggregate blending in the plant yard with equipment such as a front end loader or a bulldozer will not be permitted.

   As the non-carbonate particles are blended with carbonate aggregates to produce a high friction mix, the Plant Inspector shall visually spot check the cold feed to verify that the proper aggregates, in approximately the proposed amount, are incorporated into the mix. If the non-carbonate feed is interrupted or it is the judgment of the Plant Inspector that the quantity is insufficient, he shall notify the Producer and the Regional Materials Engineer.

D. Aggregate Tests

1. Coarse Aggregate Crush Count - The stability or strength of a bituminous mixture depends on internal friction among the aggregate particles and is related to various aggregate characteristics such as shape and surface texture. In general, the more angular the shape of the aggregate particles the higher the stability of the mix.

   The determination of coarse aggregate crush count at the plant should assure that adequate shape characteristics exist in the coarse aggregate particles.

   The crush count shall be checked at a frequency directed by the Regional Materials Engineer. The test should be conducted in conjunction with gradation analysis testing. All aggregates retained on the 1/8" sieve shall be evaluated for crush count in conformance with Appendix G - Determination of Coarse Aggregate Crush Count.

If the results are below the minimum specified for crush count, inform the producer that production may be unsuitable and notify the Regional Materials Engineer.

2-1.12 BITUMINOUS MATERIAL

The asphalt cement for paving is supplied to the mix plant in bulk form, transported by truck.

A. Evidence of Acceptability

1. The asphalt cement must be from a primary source and location as listed in the Materials Bureau Approved List 7.42-3-2, "Bituminous Materials Primary Sources", Group A, "Asphalt Cements for Paving".

2. Each delivery of asphalt cement to the plant must be accompanied by a Certified Shipment Notice, BR-162 or approved Bill of Lading Form which the Plant Inspector files as part of the plant records for evidence of acceptability. If no record of an approved Bill of Lading Form exists at the plant, then the Plant Inspector should check with the Regional Materials Engineer.

   Any asphalt cement that arrives at the plant without the proper evidence of acceptability shall not be used in Department work.

B. Storage and Handling of Asphalt Cement

Asphalt cement stored at the plant must be sufficient in quantity to allow uniform plant operation. Where more than one grade of asphalt cement is used, at least one tank will be needed for each grade.

Tanks for the storage of asphalt cement shall be capable of heating and holding the material at the required temperatures. The heating shall be accomplished by steam or oil coils, electricity or other approved means so that no flame will be in contact with the asphalt cement. If at any time the temperature of the asphalt cement in the holding tanks exceeds 350°F or if contamination is noticed, immediately notify the Regional Materials Engineer.

C. Asphalt Cement Sampling

The asphalt cement shall be sampled in accordance with sampling procedures as outlined in Appendix K. The samples taken as described therein shall be considered representative of all material used in Department work from the time of sampling until the time of the next sampling.

Form BR-170 shall be completed by the Plant Inspector and accompany every asphalt cement sample that is submitted to the Materials Bureau for testing.

2-1.20 HOLDING BINS

Hot bituminous mixtures may be stored at the mixing plant in bins especially designed for that purpose. Each holding bin shall have been initially inspected and approved by the Materials Bureau to determine acceptance for specific

holding times. In order for a holding bin to be used, the Plant Inspector shall have a copy of the Department's approval letter which list limitations and status of approval.

If material discharged from a holding bin becomes suspect as to quality or quantity the Regional Materials Engineer should be contacted.

2-1.21 MEASURING AND RECORDING DEVICES

The quantity of mixture drawn from holding bins and delivered to Department projects shall be measured and the amount recorded in a manner approved by the Director, Materials Bureau. There are two types of weighing and recording systems in use: Recording Truck Scales and Recording Suspended Bin Scales.

2-1.22 RECORDING TRUCK SCALE

A recording truck scale shall be a platform scale conforming to the requirements of the Standard Specifications, Section 401 and approved by the Director, Materials Bureau. It shall be of a capacity and size to weigh the largest vehicle in one weighing.

The truck scale shall be equipped with a recorder that will produce a ticket with a time-date print and any two of the following weights: gross, net or tare. The recorder shall be interlocked with the weighing system to allow printing only when the scale has come to a complete rest.

Tare weights shall be printed either by weighing each truck empty for each delivery, or the tare weight may be preset and printed or manually entered on the ticket. When the tare weight is either preset or manually entered, the tare weights shall be checked at least twice a day or more frequently as required by the Regional Materials Engineer.

2-1.23 RECORDING SUSPENDED BIN SCALE

A bin scale shall be a weigh box or hopper with a weighing device approved by the Director, Materials Bureau.

The system shall be interlocked so that material cannot be discharged into the weigh box until the zero return tolerance is met (as outlined in Section 401 of the Standard Specifications). The system shall be equipped with a recorder that will produce a ticket with a time-date print and the accumulated total of material actually weighed and deposited into each truck.

2-1.24 INSPECTION AND CONTROL

The truck scale or suspended bin scale shall conform to requirements outlined in Section 401 of the Standard Specifications.

The recorder shall be checked daily for proper functioning.

The Plant Inspector shall notify the Regional Materials Engineer anytime the material discharged from the bin looks questionable with regards to either quality or quantity.

2.1.30 HAUL UNITS

The mixture shall be transported from the mixing plant to the project in tight vehicles having clean and smooth metal beds. Each load shall be covered with canvas or other suitable material of such size as to protect the mixture from the weather. If necessary the truck bodies may need to be insulated in order to maintain the specified temperature.

2-1.31 RELEASE COMPOUNDS FOR ASPHALT MIXES

The inside surfaces of the haul vehicles shall be lightly coated with a release compound just before the vehicle is loaded with bituminous mixture. The release compound must be one appearing on the Materials Bureau listing of Approved Release Compounds for Asphalt Mixes, or a whitewash of lime and water.

After application and prior to loading the bituminous mixtures, if excess release compound is present, the truck bodies shall be raised for a sufficient time to allow it to drain.

SECTION 2-2
BATCH PLANT

ROUTINE INSPECTION ACTIVITIES - BATCH PLANT

	Activity	Minimum Requirements	Form Used
Control Tests	Hot Bin Analysis	Prior to initial production, plus one (1) test per 200 batches.	BR-161
	RAP Moisture Test	One (1) test per day	Diary
	RAP Extraction	One(1) test per week	BR-160
	Recycle Mix Moisture Test	One (1) test per day	Diary
	Bituminous Extraction (Recycled Mixes Only)	Two (2) tests per day	BR-160
Equipment Checks	Automation Check	As required	--
	Recordation Check	Daily	--
Sampling	Asphalt Sampling	Two (2) samples per day	BR-170
	Marshall Mixture Monitoring	One (1) per initial 500 tons and every additional 1000 tons or one (1) per day (top course mixes).	BR-353
	High Friction Aggregate Sampling	As indicated on JMF	BR-170
Paperwork	Daily Plant Report	Daily, each project	BR-343
	Maintain Diary, Records	Daily	Diary

2-2 BATCH PLANT INSPECTION

2-2.10 AGGREGATE TESTS

The Plant Inspector is responsible for sampling aggregates at various frequencies and performing tests to verify that the aggregates are within specification compliance.

Below are the sampling and testing frequencies required for batch plants while the plant is in routine production.

Test	Minimum Testing Frequency	Test Details Appendix
Hot Bin Analysis	Prior to initial production, plus one (1)* per 200 batches.	C
High Friction Aggregate Sampling	Per Job Mix Formula.	F
Coarse Aggregate Crush Count	As directed by Regional Materials Engineer	G
RAP Moisture Test	One (1) per day	E-2
RAP Extraction	One (1) per week	I

*For each mix type.

A. Hot Bin Analysis

It is essential that the aggregates in any bituminous mixture be uniformily graded through all sieve sizes. This produces a bituminous concrete mixture which is workable and a pavement which has adequate strength and is durable.

A complete aggregate gradation test is defined as a test that yields results for all specified sizes in the job mix formula. The hot bin analysis shall be used for determining the gradation of all mixes for shipment purposes.

The gradation of the aggregate from each hot bin is determined and a composite gradation of all hot bins computed mathematically. The hot bin analysis test procedure is described in Appendix C - Hot Bin Analysis.

The tendency of an aggregate gradation to consistently remain within the job mix formula limits depends upon the uniformity of the aggregate in the individual hot bins. A uniform aggregate gradation is as follows:

1. Aggregate gradation is within the job mix formula limits.

2. Coarse aggregate hot bins contain a minimum of 70% primary size.

3. The fine aggregate hot bin, material size passing the 1/8" sieve and retained on the #20 sieve does not vary by more than ±12% from that determined from the last hot bin of the same type mix.

NOTE: Requirement (2) and (3) are not required when the material in a particular bin makes up 12% or less by weight of the total mix.

2-2.20 AGGREGATE GRADATION CONTROL

The aggregate gradation control shall be based upon the results of the aggregate gradation tests performed according to the procedures and at the frequencies given under Section 2-2.10, Aggregate Tests. Anytime visual inspection or tests results indicate that the gradation of the aggregate has changed, testing frequencies shall be increased to closely monitor the situation.

The quality of production is based on several factors as indicated in this Materials Method, but the factor which requires closest attention is the aggregate gradation of the mix and uniformity of the individual aggregate sizes. In order to have full assurance that the desired mixes are obtainable within the job mix formula limits, it is necessary to have information on the capability of a plant to produce each type of mix before any is allowed to be dispatched to Department projects. The following section is used to gain such information. However, the Regional Director may waive this requirement when plant and aggregate conditions are substantially the same as they were during the last satisfactory production of the mix involved.

A. Plant Inspector's Courses of Action During Production

1. Initial Production - The following procedure applies to the initial annual production of each mix type by a batch plant and describes the necessary steps required to determine if the plant is capable of producing a mix within approved job mix formula limits. Figure 2-3 is a graphical presentation for the procedure to be followed in this situation.

   Before production is allowed, a hot bin analysis test must have been run, found within the job mix formula limits, and each coarse aggregate bin proved uniform by containing at least 70% of the primary size. Should the Producer, upon notification of a gradation outside of the job mix limits, but with all coarse aggregate bins uniform, elect to adjust his batching weights to get back in, he may do so, provided that material has not been drawn from the bins since the samples were taken. If materials have been drawn from the bins, a new complete gradation test must be made and found satisfactory before production is authorized. Once production is approved, "Routine Production," as defined below under Section A.2. shall apply starting with a complete hot bin analysis as the first test run.

2. Routine Production - The purpose of the routine production procedure is to monitor and control the batch-to-batch and day-to-day production of mixes which have previously been proved capable of being produced uniformly. A graphical presentation of routine production is shown in Figure 2-4.

   Providing that the hot bin analysis indicates satisfactory gradation, the suggested test frequency is one (1) complete hot bin analysis for every 200 batches.

   When significant changes are made in the cold feed for the production of a different mix, the Plant Inspector should attempt to sample the hot bins to detect possible influences in bin uniformity and/or gradation as soon as the new aggregate sizes begin entering the mix.

Should any hot bin test indicate non-uniformity and/or gradation results outside of the job mix limits, the Plant Inspector shall notify the Producer and immediately run a second hot bin analysis. Upon finding unsatisfactory results from the second test, the Plant Inspector shall notify the Producer that subsequent production will not be authorized. The Producer shall correct the gradation and this shall be verified by a complete hot bin analysis. This part of the procedure is independent of mix type. For example, if the last complete hot bin analysis was outside of the job mix limits for binder mix and the plant then switched to top, a complete hot bin analysis would be run on the top mix. If any results from this sample were outside of the job mix limits, production would be halted. The Producer would make the necessary corrections, and gradation being properly adjusted verified by a complete hot bin analysis before authorized production resumes.

2-2.30 BITUMINOUS CONCRETE MIXTURE

In order to determine if the specification requirements for a bituminous mixture are being met, the Plant Inspector is required to determine its temperature, review recordation to determine batching quantities, and sample the mixture so additional testing can be performed.

2-2.31 BITUMINOUS MIXTURE TESTS

The Plant Inspector is responsible for sampling and testing the bituminous mixture for various reasons. Mixture samples shall be obtained from the haul unit. Some tests are directly related to control testing and others for informational testing.

Minimum bituminous mixture sampling testing frequencies are as follows:

Test	Frequency of Test and/or Sample
Mixture Temperature	Initially, plus periodically
Mixture Moisture (Recycled Mixes Only)	One (1) per day
Bituminous Extraction (Recycle Mixes)	Two (2) per day
Bituminous Extraction (Virgin Mixes)	As established by the Regional Materials Engineer.
Bituminous Mixture Monitoring	One (1) per initial 500 tons and every additional 1000 tons or one (1) per day (top course mixes).

A. Mixture Temperature Test

To assure proper mixing and uniform asphalt coating of the aggregates, the bituminous mixture must be produced at the proper temperature. The proper mixing temperature varies depending on mix type and is determined by the Regional Materials Engineer. The Plant Inspector shall determine the temperature of each mix produced on a daily basis as follows; initially upon production of a mix and routinely thereafter. He shall record mix temperatures in his diary.

INITIAL ANNUAL PRODUCTION OF EACH MIX TYPE (BATCH PLANT)

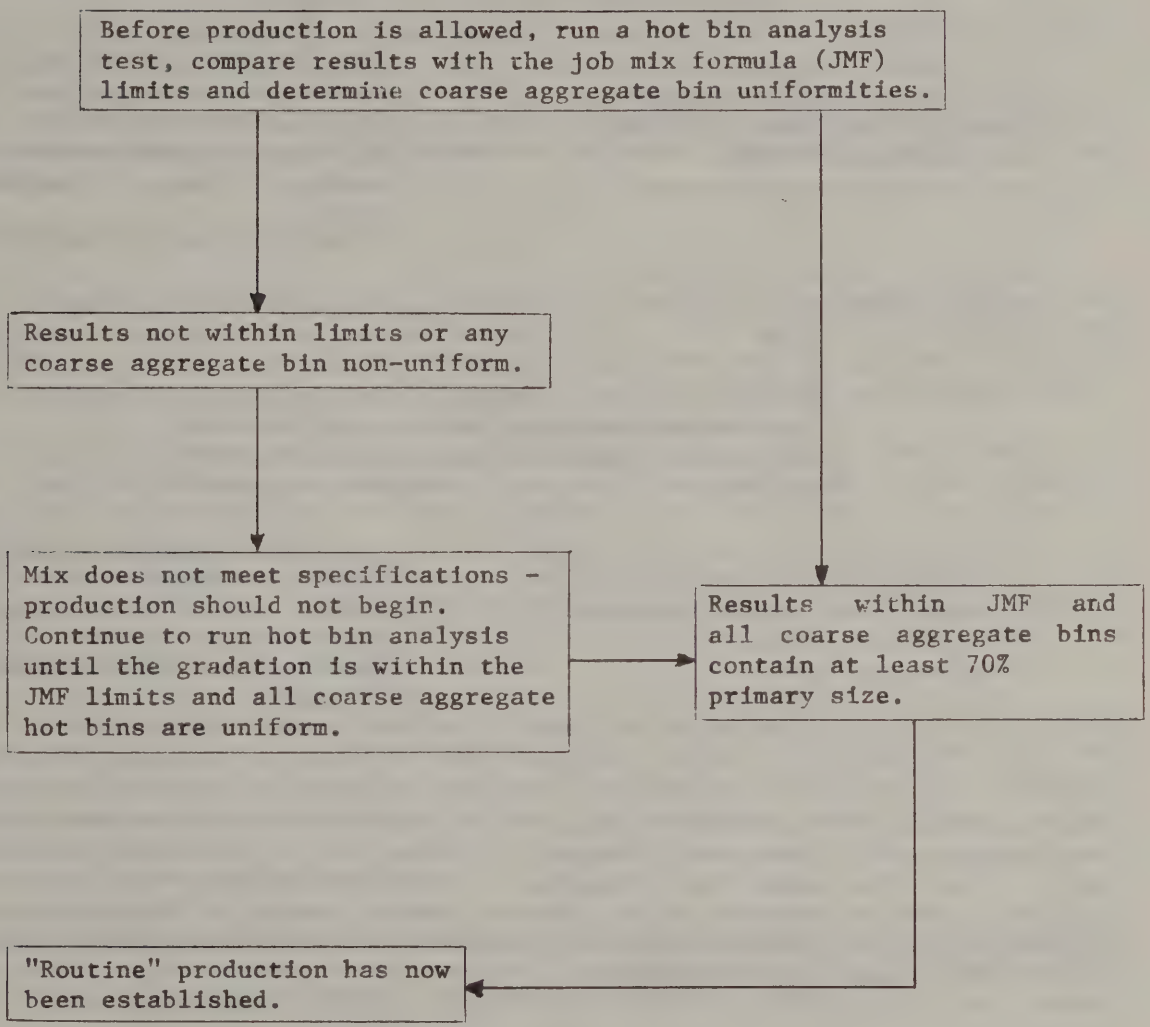
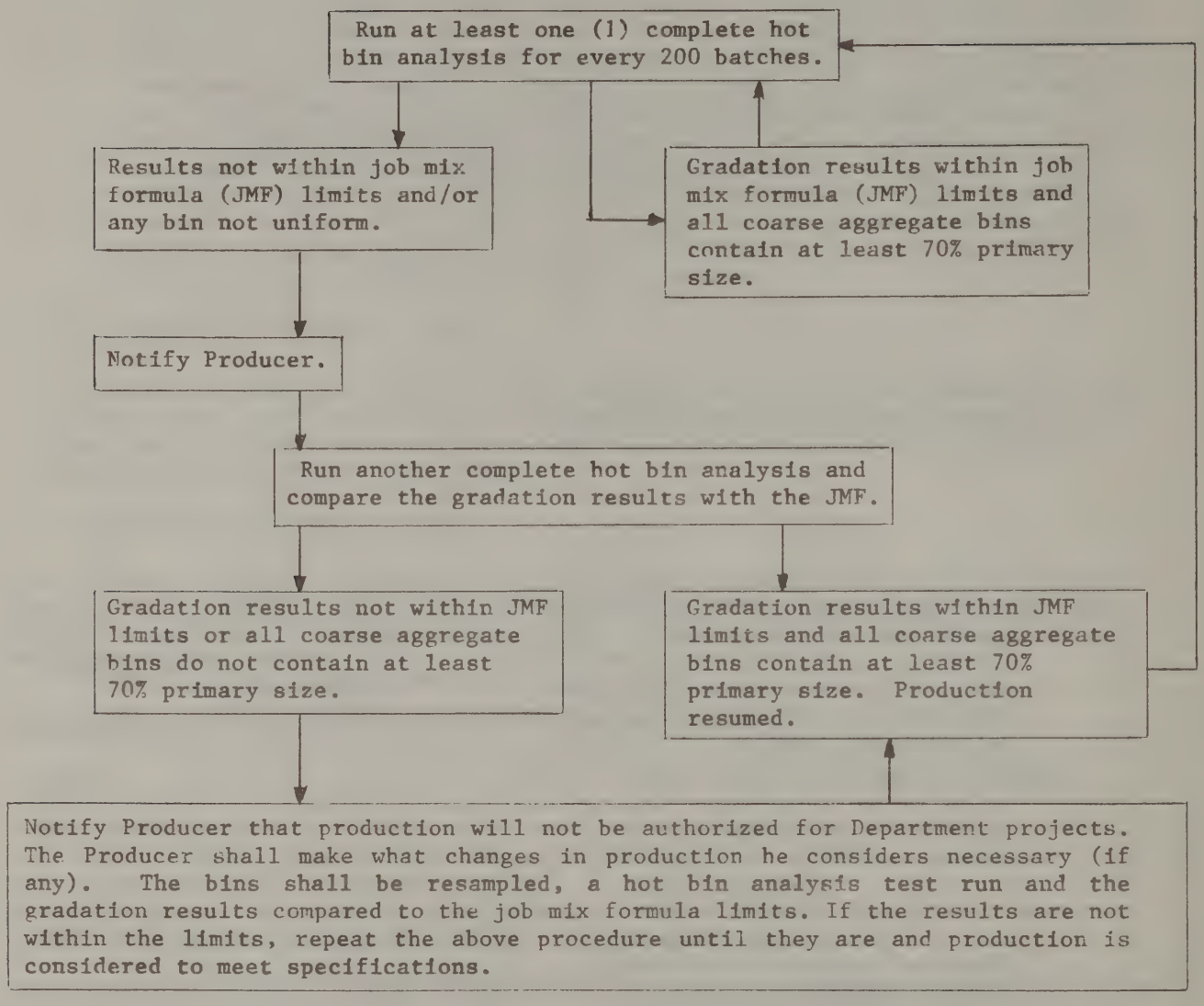


FIGURE 2-3

ROUTINE PRODUCTION (BATCH PLANT)



NOTE: The testing sequence, frequency and guidelines shall be followed consecutively from point to point in the flow diagram regardless of whether only one mix is produced or production is switched from one type to another.

FIGURE 2-4

B. Mixture Moisture Test

This test is required to be performed a minimum of once per day at batch plants producing recycled mixes. If excessive mix moisture results are obtained, the testing frequency shall be increased as directed by the Regional Materials Engineer.

For each mix produced, determine the moisture content on samples of mix discharged into the haul unit.

The moisture content of the bituminous mixture shall be determined in accordance with Appendix H - Mixture Moisture Test and recorded in the diary.

C. Bituminous Extraction Test

The bituminous extraction test indicates the approximate asphalt content and provides aggregate for gradation analysis. It is to be performed on bituminous concrete mixtures containing reclaimed asphalt pavement (RAP) in labs equipped with an acceptable exhaust hood and approved safety apparatus.

The extraction test may also be performed on virgin mixes when directed by the Regional Materials Engineer. It shall be performed at the Regional Materials Laboratory or at the bituminous concrete plant if the lab is properly equipped.

Testing details are outlined in Appendix I - Bituminous Extraction Test.

D. Bituminous Mixture Monitoring

The Plant Inspector shall sample all top course paving mixtures and prepare Marshall specimens as outlined in Appendix J once per initial 500 tons and every additional 1000 tons or once per day minimum, in order that Marshall properties may be monitored.

2-2.32 ASPHALT CONTENT DETERMINATION

The Plant Inspector shall determine the actual asphalt content of the bituminous mixture daily by verifying batch recorded quantities (See example below). For recycle mixtures see, Appendix I - Bituminous Extraction Test.

TRUCK TICKET RECORDATION

Delivery Ticket Number 00123

ABC PAVING PRODUCTS

Charge To: XYZ CONTRACTORS
Deliver To: D600111 NORTHTOWN-PARKVILLE, PT. 1
Material: ITEM BINDER COURSE
Driver: J. JONES Truck Number: 14

Date	Time	AGG1	AGG2	AGG3	AGG4	Filler	Asphalt	Total
Sept. 21,	1987	1050	1970	3045	4680	0	309	4989
	0839	1045	1930	3040	4675	0	310	9974
		1050	1915	3060	4685	0	308	14967
		1055	1985	3075	4675	0	309	19951
Mix 2								Truck Total

$$\text{Asphalt Content} = \frac{\text{Asphalt Weight (lbs.)}}{\text{Total Batch Weight (lbs.)}} \text{ X } 100 = \frac{309}{4989} \text{ X } 100 = 6.2\%$$
(Aggregate + Asphalt)

Compare the 6.2% calculated from the recordation against that called for on the job mix formula.

The Plant Inspector shall determine the asphalt content of each mixture produced daily by checking recorded quantities during production.

2-2.33 BITUMINOUS MIXTURE CONTROL

The bituminous mixture control shall be based upon the following:

1. Temperature - The bituminous mixture must be produced to within ±20°F of the established mix temperature. If loads are outside these limits they shall not be authorized for shipment. Corrective measures shall be taken by the Producer.

2. Mix Moisture (Recycle Mix Only) - If the moisture content of the mixture exceeds 0.5%, the Plant Inspector shall inform the Producer that plant production will not be authorized until satisfactory corrections are made.

3. Asphalt Content Determination - If review of the recordation reveals that the asphalt content is more than ±0.1% from Job Mix Formula target asphalt content, the Plant Inspector shall notify the Producer that this out of tolerance production will not be authorized.

2-2.40 QUANTITY DETERMINATION

The Plant Inspector shall determine the authorized batches of bituminous concrete for each project by reviewing the production records. Authorized bituminous concrete batches are batches that are made with acceptable materials and properly proportioned. A properly proportioned batch is one in which the material quantities are within allowable batching tolerances.

Recordation of the proportioning process is utilized in several different ways, depending upon the truck weighing procedures at the plant and the particular type of recordation.

The dispatched quantities are determined by summing up for each mix type the delivery ticket quantities shipped to each project.

Depending on the Regional procedures either the dispatched quantities or theoretical quantities may be used to complete the BR-343, Daily Bituminous Concrete Plant Report. The theoretical quantity is the number of batches multiplied by the appropriate batch size.

2-2.50 PROPORTIONING AND MIXING METHODS

The Plant Inspector shall inspect the proportioning and mixing methods used to assure the Department that the materials incorporated into the mixture are properly proportioned and mixed. The proportioning and mixing equipment is inspected annually and then periodically throughout the season by the Regional Materials Engineer or his representative. It is essential that the Plant Inspector be acquainted with all of the equipment and its operation for the plant being inspected.

The batch plant system uses the concept of individually proportioning and then mixing a complete batch of bituminous mixture. By simultaneously proportioning one batch while another one is mixing it is possible to keep a continuous operation going. This is the normal procedure for batch plant operation.

2-2.51 MEASURING DEVICES

A. Weight

All aggregates including mineral filler are proportioned by weight. Asphalt cement is generally proportioned by weight, but it may be proportioned by volume. Weighing devices whether dial scales using lever systems or digital readouts using load cells shall be tested to assure that the accuracy meets the requirements listed in Section 401 of the Standard Specifications. These devices shall be checked annually prior to Department use, at periodic intervals as listed in Section 401 of the Standard Specifications, at any time the plant changes location, or at any time chosen by the Regional Materials Engineer or his representative.

If the weighing unit or measuring device shows signs of inaccurate measurement the Plant Inspector shall notify the Producer and the Regional Materials Engineer.

B. Volume

Asphalt cement may also be proportioned by metering. These meters are usually the temperature compensating type which measures the volume at a 60°F standard regardless of what the line temperature of the asphalt is. The meter accuracy shall meet the requirements given in Section 401 of the Standard Specifications.

2-2.52 AUTOMATIC PROPORTIONING CONTROLS

Automated batch plants shall be equipped with an automatic proportioning and cycling system to measure the quantity of aggregates and asphalt. The proportioning equipment automatically draws stored material in a preselected sequence in such a manner that it will attempt to match the programmed (cutoff) weight which has been set into the system by the operator. After each material is drawn, the system automatically checks to determine if the quantity is within the batching or delivery tolerances given in Section 401 of the Standard Specifications. Whenever a weighing error in batching occurs (outside the permissible tolerance), the automatic cycle will be interrupted until corrective action is taken.

A. Batching Control Panel

The major components of a control panel and their functions are described in this section. Some typical control panels are shown in Figure 2-5.

1. Bin Level Indicator - Indicates the approximate level of the material in the bin. One indicator must be located at the lower quarter point of each bin.

2. Preset Dials - One method to preset design batch weights into the control panel.

3. Card Reader - Reads prepunched formula card to preset design batch weights into the control panel.

4. Keyboard - Inputs batch weights for each mix into a computer panel.

5. Freefall Setting - Aggregate and asphalt batcher gates are closed prematurely to allow for material in mid-air suspension. This device in conjunction with the "chatter bite control" provides accurate weighing.

6. Chatter Bite (Jog) Setting - Adds aggregate or asphalt slowly to bring weight in weigh hopper or weigh bucket up to programmed weight.

7. Under-Over Indicators - Indicate whether the weight of a particular aggregate or asphalt is under or over the interlock settings (batching tolerance) of the programmed weight.

8. Sequence Indicators - Indicate when certain batching operations are under way or complete.

9. Dry Mix Timer - Controls the pugmill dry mix time (aggregate only).

10. Wet Mix Timer - Controls the pugmill wet mix time (aggregate and asphalt).

11. Pugmill Discharge Timer - Controls the length of time the pugmill discharge gate is open.

12. Formula-Card Switch - Controls batching by card reader or presets.

13. Manual Draw Controls - Manual controls to draw aggregate and asphalt. Lights are sometimes incorporated in these controls that indicate batch progress during batching.

14. Bin Selection Settings - Controls the order of the bin that aggregates are drawn from during the batching process.

15. Batch Size Setting- Determines the size of the batch to be produced from minimum size to pugmill capacity.

16. Tonnage Setting - Automatically recycles the batch system until a predetermined tonnage is proportioned, mixed and discharged.

17. Batch Counter - Totalizes the number of individual batches produced.

18. Automatic/Manual Control - Control for setting type of batching operation. In "automatic" all operations are automatic. In "manual" all operations are controlled manually by means of individual push buttons. Some plants may also have a commerical position which allows automated batching without delivery tolerances.

19. Recorder Control - Activates the recorder.

20. Manual Print - Actuates the recorder to print an individual weight.

21. Emergency Stop - Stops operation at any time in the cycle.

22. Start - Master control to start batching operation.

23. Interlock (Batching Tolerance) Settings - Sets an acceptable batching range for each material being weighed.

24. Inspection Switch - Stops cycle at the next batching point (after switch is activated) so that the accuracy of batching and tolerance settings can be inspected.

B. Formula Setting Controls

The automatic proportioning systems have one or more formula setting controls. The various types of controls are described below:

1. Dial Presets - Aggregate draw weights for each bin are set on the preset dials. These weights may be an individual bin draw weight or a cumulative weight. The formula may be set up for a full batch, a one ton batch or a 1000 pound batch, depending on the particular system. Asphalt weight or gallonage is set in a similar manner.

2. Punch Type Card Reader - Bin draw weights and asphalt weights or gallonage are punched on a card using a hand punch or special card punching device. In some systems, all spaces are punched except those that combine to give the proper weight. The prepared card is then inserted into a card reader on the control panel.

3. Keyboard Input System - Aggregate draw weights and asphalt design weights for each material are entered into a computer through a keyboard unit. Some systems input the weights as percentages of a total batch weight. Other systems put in each aggregate and asphalt weight on either an individual basis or a cumulative weight basis, to make up a total batch.

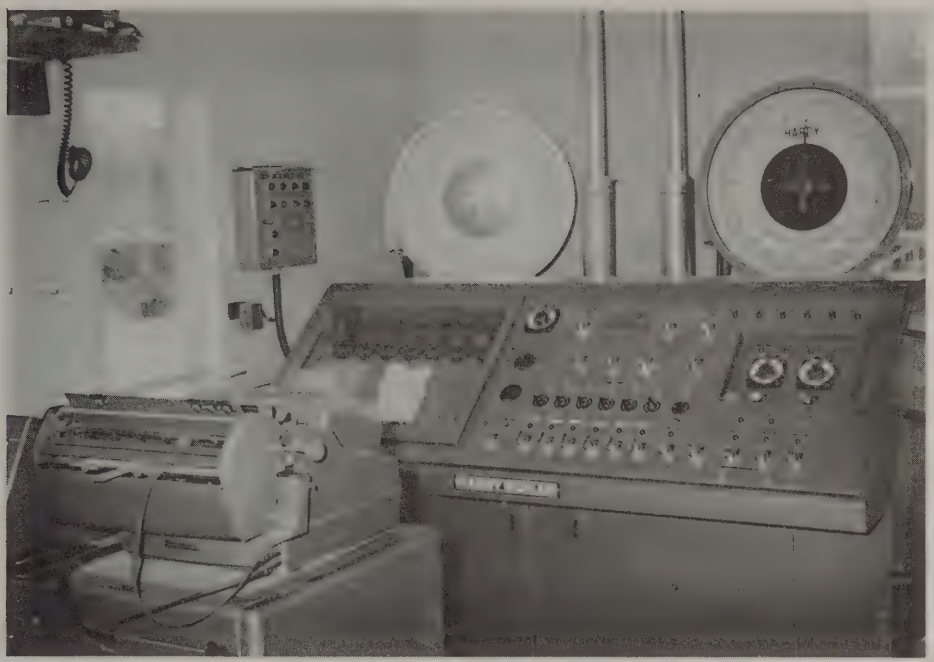
C. Freefall Compensation and Chatterbite Settings

Most systems have controls to allow for material in mid-air suspension. These are called "freefall" or "suspension compensators." These controls slow down or prematurely stop the draw of materials so the amount of falling material is compensated for in weighing or metering. These controls are adjusted manually or automatically for each component during production.

The chatter bite control is an adjustable timing device that opens and closes the bin gates in a jogging fashion. This permits the weigh hopper to accumulate more material automatically to meet the programmed weight when the initial weighing is below the desired draw weight.

D. Batching Tolerances

Batching tolerances for all the materials are listed in Section 401 of the Standard Specifications. These tolerances shall be applied to each batching formula and the acceptable batching range for each weight shall be determined. The aggregate and asphalt batching tolerances shall be based upon the total batch weight. Total batch weight includes both aggregate and asphalt.



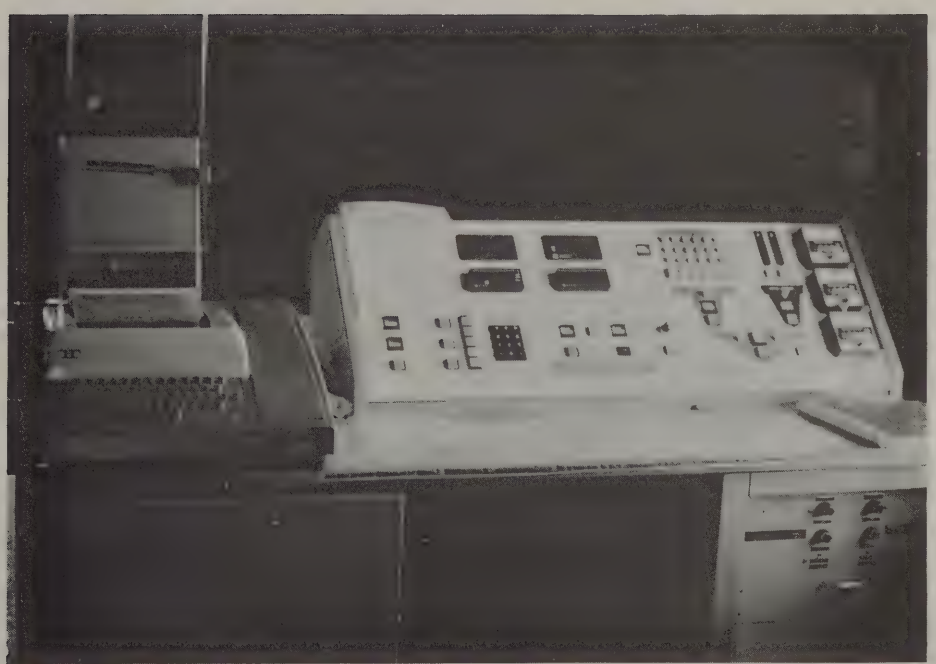
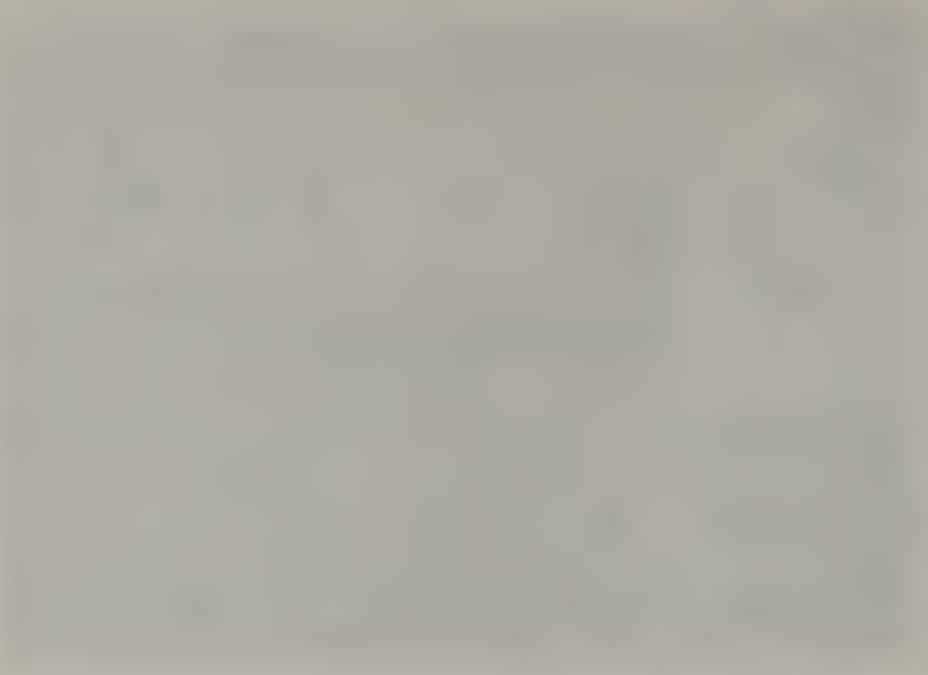


FIGURE 2-5a



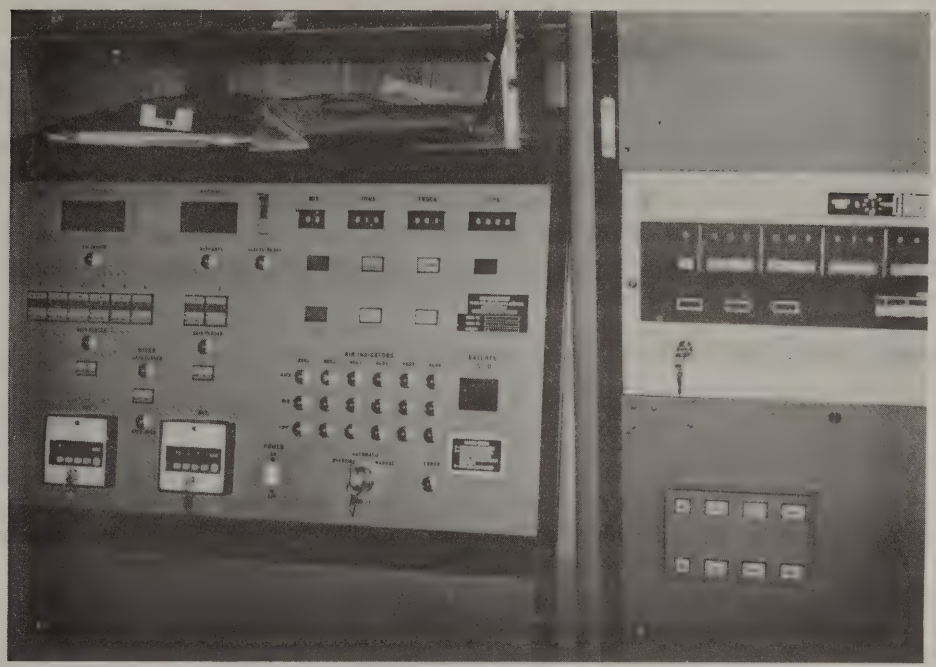
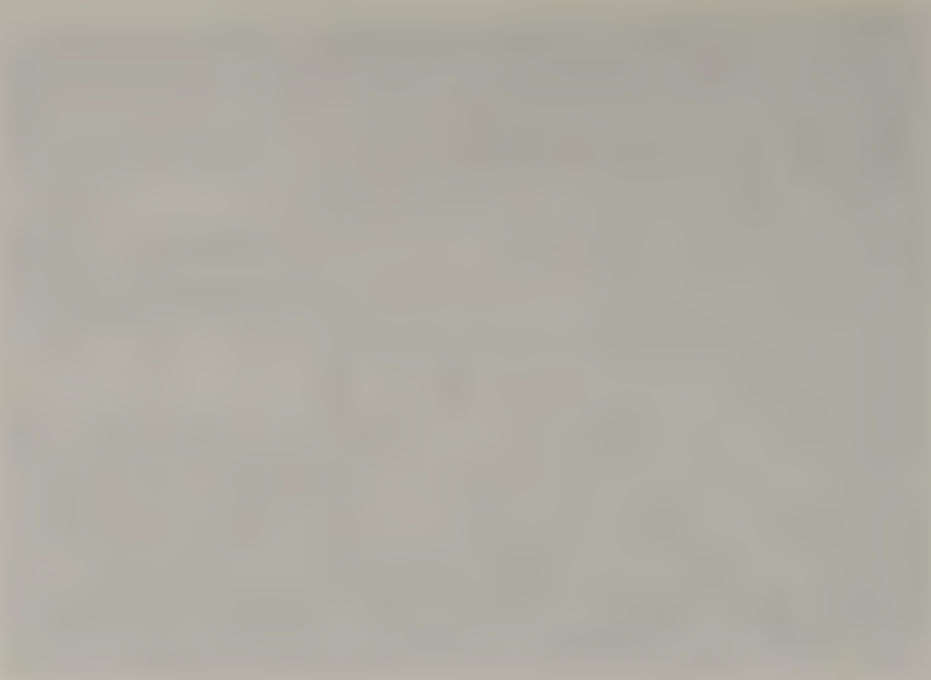
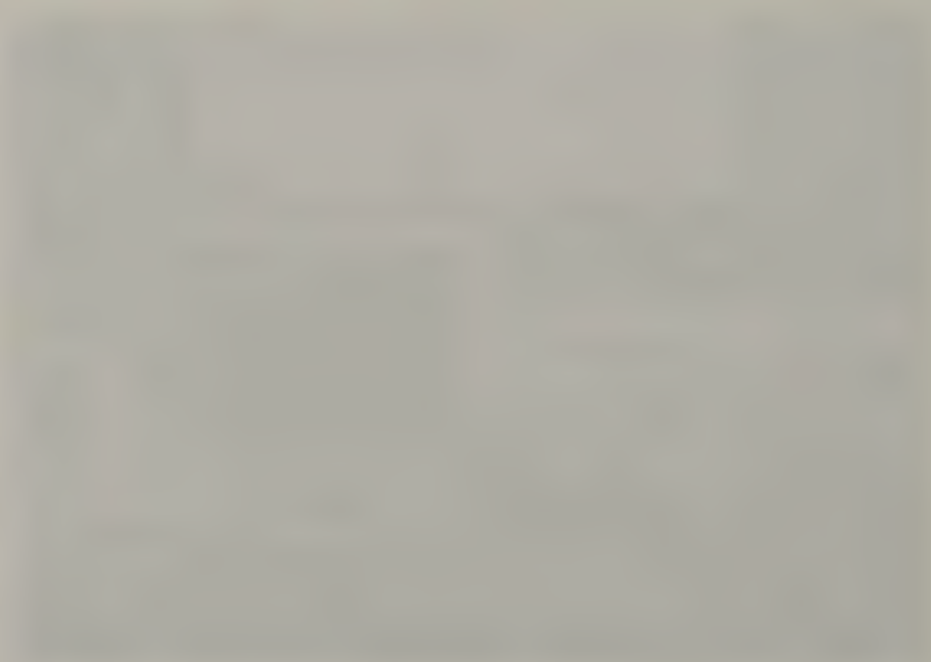


FIGURE 2-5b





Since the allowable batching tolerances vary with batch size, some automation systems automatically vary the batch tolerance interlock settings when a change is made in the tonnage setting. Plants that do not have the batching tolerance interlock control tied in with the tonnage setting have batching tolerances set for the minimum allowable batch size.

The zero tolerance is the scale or meter condition that must be satisfied before batching can start. The zero tolerance is based on the minimum batch size.

The determination of tolerances is illustrated in the following example:

Total Batch Size = 4000 lbs.
Aggregate Tolerance = 4000 lbs. X 1.5%* = ±60 lbs.
Mineral Filler Tolerance = 4000 lbs. X 0.5%* = ±20 lbs.
Asphalt Tolerance = 4000 lbs. X 0.1%* = ±4 lbs.

*Batching tolerance from Section 401 of the Standard Specifications.

Material	Cumulative Weight	Tolerance	Acceptable Range
Agg. 1	1000	±60	940-1060
Agg. 2	2000	±60	1940-2060
Agg. 3	3000	±60	2940-3060
Agg. 4	3600	±20	3580-3620
Mineral Filler	3750	±20	3730-3770
Asphalt	250	±4	246-254

The zero tolerance for aggregate and asphalt scales and asphalt meters shall be as outlined in Section 401 of the Standard Specifications.

When mineral filler is used, the aggregate batched immediately before the filler shall have the same delivery tolerance as the filler. When a control system does not have a separate tolerance setting for mineral filler and a mix with mineral filler is being produced, all the aggregates must be batched to the tolerance required for mineral filler. When a portion of total batch size is batched, the tolerances shall be reduced proportionately.

E. Batching Interlocks

All automatic batching control systems shall have interlocks to provide assurance that the batched quantities of aggregate and asphalt are within specifications. The interlocks shall interrupt the cycle whenever an error occurs during any of the following batching functions:

-Weighing the aggregate and asphalt.
-Scale or meter fails to return to zero tolerance.
-Recorder fails to print aggregate or asphalt.
-Aggregate weigh hopper or asphalt weigh bucket or meter fails to discharge.
-Dry and wet mix timers fail to operate.
-Pugmill discharge gate fails to operate.

1. Weighing Tolerance Interlocks - The weighing tolerance interlocks shall be set at the underweight and overweight cut-off points or tighter. In general, the underweight and overweight cut-off points will be equally distant from the target weight.

   The interlocks shall not allow batching to exceed the permissible tolerance by more than one scale or meter graduation. When plants produce different batch sizes and if the tolerances do not automatically adjust, the tolerance settings shall be set for the minimum permissible batch size.

2. Zero Tolerance Interlocks - The zero tolerance interlock prevents a new batch from being weighed until the hopper is emptied of the previous batch and the scale pointer has returned within the zero tolerance. The interlock shall be set at the zero tolerance based upon the minimum batch size. The tolerance only applies to the plus side of zero. If the scale is continually resting behind zero the scale is considered to be inaccurate and shall be adjusted.

3. Weigh Hopper Interlocks - The aggregate and asphalt inlet gates or valves shall be interlocked with the automatic cycle so that they cannot open while the weigh hopper discharge gates are open. Also the weigh hopper discharge gates shall be interlocked with the automatic cycle so that they cannot open while the inlet gates or valves are open.

   The weigh hopper discharge gates or valves for aggregate and asphalt cement shall be interlocked so that they cannot be opened until the batching of the programmed quantity of aggregate and asphalt is complete.

4. Mixer Interlocks - The pugmill discharge gate shall be interlocked such that it will not open until the wet mix timer and the dry mix timer have completed their timing periods. The dry mix timer shall complete its cycle before the wet mix timer starts.

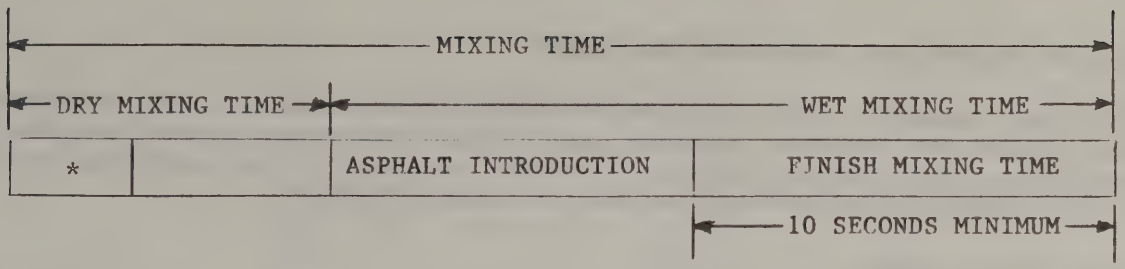
   The Plant Inspector shall determine the accuracy of the timers.

   Request for mixing times other than the 15 second dry mix and 45 second wet mix shall be submitted by the Producer to the Regional Office having jurisdiction over the plant. Through visual inspection and verification of acceptable uniformity in conformance with Section 401 of the Standard Specifications, these times may be used in production after written approval of the Regional Director. Copies of the approval shall be distributed to the Plant Inspector, Producer, Regional Office and Materials Bureau.

   a. Mixing Times

      1. Base Courses - In no case shall the mixing times for base course mixes be reduced so the finish mixing time is less than ten (10) seconds. See Figure 2-6.

      2. Top and Binder Courses - In no case shall the dry mixing time be less than ten (10) seconds and the finish mixing time less than ten (10) seconds. See Figure 2-6.



*Weigh Hopper Discharge Time

NOTE: For base courses the dry mixing time may consist of the weigh hopper discharge time only.

FIGURE 2-6

2-2.53 RECORDERS

Recordation equipment shall be used to provide the Department with a legible printed record of the materials incorporated into the bituminous concrete mixture. It shall be electrically connected to the scales, meters and batching controls such that the cumulative quantities of each aggregate component, and asphalt cement for each batch of bituminous concrete will be recorded. In addition, all records shall show the mix identification, the day, month, year, and time of day to the nearest minute. Each batch is to be permanently identified.

Some of the recorded information may be in a coded form. Therefore, the Plant Inspector should have a sample record showing and explaining the codes used to represent various information at each plant.

The quantities and other batch information shall be printed on either a ticket or a continuous tape. The principal difference between these two methods is that the ticket is a multicopy form with preprinted serial numbers and the tape recordation has a batch identification number printed for each batch. Figure 2-7 shows a typical printed tape and ticket respectively.

The digital recordation shall contain the following information:

1. Aggregate identification and amount of each aggregate batched
2. Asphalt quantity
3. Total batch weight
4. Time and date of the load or batch
5. Serial number

When the printed digital record is used as part of the delivery ticket the Producer shall provide the Plant Inspector with one legible copy.

The resolution of the digital recorder shall be equal to or less than the scale graduations or load cell readout. The digital printers shall be checked for accuracy by holding the scale pointer at several points on the scale dial or electrically advancing a load cell readout and manually causing the recorder to print. The weight printed on the recordation shall agree within one scale graduation or load cell readout division of that indicated by the weighing device.

2-2.60 PRODUCTION INSPECTION AND CONTROL

The Plant Inspector must take the necessary steps to assure that production of the bituminous concrete mixtures are within Department Specifications. In addition to the required materials testing outlined in the preceding sections, the following procedures must be done on a daily basis:

Prior to Production

1. Check to see that the correct aggregate sources and sizes are in the proper cold feed bins.

2. Check with the plant operator to see if the proper aggregate and asphalt batch weights are programmed into the control panel.

3. Check to see that the control panel is in the automatic mode and that the aggregate, mineral filler (if used) and asphalt interlocks are turned on.

During Production

1. Observe the scales, automatic batching controls and recorder soon after production begins to see if they are working properly.

2. Spot check the recordation to see if the weight tolerance interlocks are working.

3. If a recording truck scale is used and trucks are not tared prior to each loading, see that each truck is weighed empty at least twice a day.

4. Check the mix temperature in the trucks. This must be within 20°F of the temperature specified.

2-2.61 BATCHING CYCLE INTERRUPTIONS

When the automatic control interrupts the cycle because the batched quantity is outside the tolerance interlock settings, the Plant Inspector shall take the following action:

1. If the interlock settings are set less than the allowable batching tolerance range for the batch in question, but the batch is within the allowable tolerance range for the size batch being produced, the Plant Inspector shall authorize the batch and note the authorization on the recordation of the batch.

2. If the interlock settings are set at the allowable batching tolerance for the batch in question, the Plant Inspector may do one of the following and note it on the recordation:

   Aggregate or Asphalt Overweight - Reject the batch.

   Aggregate or Asphalt Underweight - Add additional material from the proper bin by manual cycle control to bring the batch within tolerance.

PRINTED TAPE RECORDATION

AGG ZERO	00	SCALE ZERO WEIGHT
BIT ZERO	00	
AGG 1	1000	
AGG 2	2000	CUMULATIVE AGG. WEIGHT
AGG 3	3500	
AGG 4	4200	
M.F.	4539	
BITUMEN	481	BITUMEN WEIGHT
TOTAL	5020	TOTAL BATCH WEIGHT
TIME 0851		
DATE MAY 15, 1987	1125	BATCH NUMBER
MIX IDENTIFICATION MIX 2		

TICKET RECORDATION

ZYX BLACKTOP CO.
Town, New York

00004

SOLD TO

NET DUE 15TH OF MONTH 1¼% PER MONTH CARRYING CHARGE OVER 30 DAYS OR 18% PER ANNUM ACCOUNTS OVER 90 DAYS ARE SUBJECT TO ADDITIONAL 20% ATTORNEY COLLECTION FEE.

JOB NO.	TRUCK	TONS REQ.	PLANT	PRODUCT	PRODUCT DESCRIPTION
1	123	7.00	5	1	

AG.TW	AC.TW	AG1	AG2	AG3	AG4	AC1	TOTAL
5	1.5	940	1950	2950	3745	203.0	3948.00
0	0.0	950	1985	2970	3760	198.5	3958.50
0	0.0	1480	2925	4410	5610	301.5	5911.50

NET LOAD= 13818.00 LBS 6.91 TONS

LOAD NO.= 6 JOB TOT.= 20.42 TONS

14:09 04/24/85

RECEIVED BY:_____

FIGURE 2-7

If the automatic cycle is frequently interrupted when the weight tolerance interlocks are set for the minimum batch weights, the Plant Inspector should notify the Regional Materials Engineer. The Materials Engineer can increase the minimum batch weights and consequently the minimum tolerance range to the point where the plant will batch consistently without interruptions.

2-2.62 EQUIPMENT MALFUNCTIONS AND BREAKDOWNS

When a breakdown in the automation and/or recordation occurs, the Plant Inspector shall notify the Regional Materials Engineer. If the bituminous concrete production is interrupted or the quality is affected by the breakdown, the Plant Inspector may also notify the Project Engineer per Regional policy. The Regional Materials Engineer may allow the Producer to batch and mix bituminous concrete for a period not exceeding 48 hours from the time of breakdown providing that specification material can be produced and recorded automatically or manually. The 48 hours are two consecutive calendar days excluding Sundays and New York State legal holidays. Written permission of the Regional Director will be required for the Producer to operate without these instruments for periods longer than 48 hours.

When only portions of the batching or recordation equipment will not operate properly, it is the Plant Inspector's responsibility to determine the seriousness of the problem. It may be possible for the Producer to correct the problem without having to enter the 48 hour breakdown period. Some of the problems that may occur and action that an Inspector can take immediately are as follows:

	PROBLEM	SUGGESTED ACTION
1.	Draw weights incorrect.	Check formula settings.
2.	Draw weights incorrect, formula setting correct.	Use alternate formula setting (e.g. presets instead of card).
3.	Draw weights out of tolerance, batching not automatically stopped by interlocks.	Stop production, check tolerance settings.
4.	Draw weights in tolerance, batching stopped frequently by interlocks.	Check interlock settings.
5.	Scale pointer or load cell readout not returning within zero tolerance and batching continues.	Stop production, check zero tolerance setting, check for material caught in weigh hopper.
6.	Scale pointer or load cell readout returns to zero, batching stopped. by zero interlocking.	Check zero tolerance setting.
7.	Scale pointer vibration or load cell readout fluctuations causing interlocks to stop batching frequently.	Allow an increase in dampening to an extent which does not exceed the limit of scale or load cell sensitivity.
8.	Mechanical or electrical equipment malfunction or failure.	Stop production, notify Producer and attempt to determine the cause of malfunction or failure. Notify Regional Materials Engineer.

2-6.63 BATCH SIZE

The minimum batch size shall be no less than 50% of the manufacturers rated capacity of the pugmill. A minimum batch size larger than 1/2 the pugmill capacity may be established due to scale or load cell limitations.

The minimum batch size is determined by the Materials Bureau personnel at the time of the initial equipment inspection. If the Regional Materials Engineer finds that the cycle is frequently interrupted during the plant operation with the minimum batch size as established by the Materials Bureau he may increase the minimum batch size.

PLANT INSPECTOR'S CHECKLIST

Materials

1. Do you have an aggregate certification from the Producer showing all the required information?
2. Are the aggregate stockpiles identifiable and separated by sources and sizes?
3. Have you performed tests on the aggregates
   - before production starts?
   - before starting after a shutdown?
4. Are the aggregates in the stockpile those approved on the Job Mix Formula?
5. Do you understand the start-up and routine control diagrams shown in Figures 2-3 and 2-4.
6. Do you have asphalt delivery forms BR-162 or equivalent to prove you are using acceptable asphalt?

Production

7. Have you checked with the Regional Materials Engineer to find out if the plant equipment has limitations?
8. Have the scales and meters been tested for accuracy recently?
9. Are the design weights properly programmed into the control panel?
10. Do you know the codes on the recordation?
11. Do you know what information is required on the recordation?
12. Do you know what a breakdown is and when the 48 hour breakdown period begins and ends?
13. Do you approve of the condition of the haul units?
14. If storage bins are used do you know their limitations?
15. Do you know what the batching tolerances are?
16. Are the weighing tolerance interlocks set and working properly?
17. Do you know what to do when a material weight is outside the interlock settings and the cycle is interrupted?
18. Do you know what your minimum batch weights are?
19. Do you know that the weighing tolerance interlocks set on the control panel may be set for less than the allowable tolerance for some batch sizes?

SECTION 2-3
DRUM MIX PLANT

ROUTINE INSPECTION ACTIVITIES - DRUM MIX PLANTS

	Activity	Minimum Requirements	Form Used
Control Tests	Stockpile Uniformity	Test as often as necessary to assure uniformity.	BR-159
	Composite Gradation Analysis	One (1) test prior to initial production plus one (1) test per mix type, minimum two (2) per day.	BR-159
	Bituminous Extraction (Recycled Mixes Only)	Two (2) tests per day.	BR-160
	Moisture Test (Composite Samples)	Twice daily (minimum).	BR-159
	RAP Moisture Test	One (1) test per day.	BR-159
	Moisture Test (Mix Sample)	One (1) test per day per mix type.	BR-159
Equipment Checks	Aggregate and Asphalt Interlock Check	As required	--
	Recordation Check	Daily	--
Sampling	Asphalt Sampling	Two (2) samples per day.	BR-170
	Bituminous Mixture Monitoring	One (1) per initial 500 tons and every additional 1000 tons, or one (1) per day (top course mixes).	BR-353
	High Friction Aggregate Sampling	As ordered. See Job Mix Formula.	BR-170
Paperwork	Review Recordation	Daily	--
	Daily Plant Report	Daily, each project	BR-343
	Maintain Diary, Records		--

2-3 DRUM MIX PLANT INSPECTION

2-3.10 AGGREGATE TESTS

The Plant Inspector is responsible for sampling aggregates at various frequencies and performing tests to verify that the aggregates are within specification compliance.

Below are the sampling and testing frequencies required for drum mix plants while the plant is in routine production.

Test	Test Frequency	Test Details Appendix
Stockpile Gradation	Fine and coarse aggregate, as required.	B-1 B-2
Composite Aggregate Gradation Analysis	Prior to initial production, plus one (1) per mix type, minimum two (2) per day.	D
Composite Aggregate Moisture Test	Twice daily (minimum).	E-1
High Friction Aggregate Sampling	Per Job Mix Formula.	F
Coarse Aggregate Crush Count	As directed by Regional Materials Engineer.	G
RAP Moisture	One (1) per day.	E-2
RAP Extraction	One (1) per week.	I

A. Stockpile Gradation

The Plant Inspector's responsibility regarding testing of stockpile gradation is limited to drum mix plants only.

Drum mix plants produce bituminous concrete mixtures that reflect directly whatever is input into the system. The aggregate from the stockpile is proportioned without rescreening. Therefore, the point of control of aggregate uniformity is at the stockpiles.

The Plant Inspector shall sample the coarse and fine aggregate stockpiles to determine gradation at frequencies established by the Regional Materials Engineer. Sampling requirements are described in Appendix A - Sampling of Aggregates. Testing requirements are described in Appendix B-1, Stockpile Gradation Test - Coarse Aggregate and Appendix B-2, Stockpile Gradation Test - Fine Aggregate.

The Producer is required to submit a gradation for each stockpile. The Plant Inspector tests the stockpiles to determine if the stockpile gradation conforms to the original gradation.

If the Plant Inspector's coarse aggregate stockpile test results deviate by more than ±5% from the submitted original gradation results, but the composite aggregate results are within the Job Mix Formula Limits continue production and notify the Producer that possible aggregate gradation problems can be anticipated. The failing stockpile should be immediately resampled and retested. If the second test is out of the deviation limits, the stockpile shall be rejected. Fine aggregate having variations that would cause unacceptable gradations in the mixture will be rejected. The Producer may take corrective action by reworking the rejected stockpile to bring it back into gradation or the Producer may submit new stockpile gradation limits. The Producer may also bring in new materials and submit new gradation limits.

B. Composite Gradation Analysis

It is essential that the aggregates in any bituminous mixture be uniformly graded through all sieve sizes to produce a bituminous concrete which is workable and has adequate strength and durability once it has been placed and compacted.

A complete gradation test for a bituminous concrete mix is defined as a test that yields results for all specified sizes in the job mix formula. The composite gradation analysis at a drum mix plant shall be used for determining the gradation of all mixes for acceptance purposes. If specification conforming mineral filler is being added to any mix separately it shall be considered as 70% passing the #200 sieve and 100% passing the #80 sieve, unless documentation exists showing the gradation to be different in which case the documented -80 and -200 values will be used. It shall be added to the composite aggregate gradation for any mixes requiring it in the proportion that it is added to the mix during production.

The composite gradation analysis test procedure is outlined in Appendix D - Composite Aggregate Gradation Analysis.

C. Composite Aggregate Moisture Test

In drum mix plants the aggregate is weighed over the belt scale before drying. Since the undried aggregate may contain an appreciable amount of moisture that can influence the aggregate's weight an accurate measurement of aggregate moisture content is important. An accurate moisture content permits adjustments to the automatic asphalt metering system to ensure that the amount of asphalt delivered to the drum is proper for the amount of dry aggregate.

The Plant Inspector shall determine the moisture content of a composite aggregate sample for the mix being produced at least twice daily. If the Plant Inspector has reason to believe the composite aggregate moisture content has significantly changed since the last moisture test, he shall take the following course of action:

1. If the production has not started, do not allow it to start until a moisture test is conducted and the correct moisture content is input into the system, or

2. If the plant is producing, immediately run a moisture test to determine the new moisture content. While the test is being run the Plant Inspector may estimate an interim moisture content to be input into the system.

2-3.20 AGGREGATE GRADATION CONTROL

The aggregate gradation control shall be based upon the results of the aggregate gradation tests performed according to the procedures and at the frequencies given under Section 2-3.1, Aggregate Tests. Any time visual inspection or tests results indicate that the gradation of the aggregate has changed, testing frequencies shall be increased to closely control the situation.

The quality of production is based on several factors as indicated in this Materials Method, but the factor which requires closest attention is the aggregate gradation of the mix and uniformity of the individual aggregate sizes. In order to have full assurance that the desired mixes are obtainable within the job mix formula limits, it is necessary to have information on the capability of a plant to produce each type of mix before any is allowed to be dispatched to State projects. The following section is used to gain such information. However, the Regional Director may waive this requirement when plant and aggregate conditions are substantially the same as they were during the last satisfactory production of the mix involved.

A. Plant Inspector's Courses of Action During Production

1. Initial Production - The following procedure applies to the initial annual production of each mix type by a drum mix plant and describes the necessary steps required to determine if the plant is capable of producing a mix within the approved job mix formula limits. Figure 2-8 is a graphical illustration for the procedure to be followed in this situation.

   Before production is allowed, the aggregate stockpiles shall be tested for gradation. If the stockpiles are found to be within the specified gradation limits and after the proportions for the individual aggregate feeds have been established, test a composite aggregate sample for gradation. If both the stockpiles and the composite aggregate sample conform to the specified gradation limits "Routine Production," as defined under Section A.2. shall begin.

   If the stockpile and/or composite sample gradations are out of specification then the producer shall be required to either rework the aggregate stockpiles to achieve specified stockpile gradation or resubmit a new stockpile gradation and new cold feed proportioning rates. Upon the producer taking corrective action, resample the composite aggregate and any stockpile requiring corrective action for conformance to the specified gradation limits.

2. Routine Production - The purpose of the routine production procedure is to monitor and control the day-to-day production of mixes which have previously been proved capable of being produced. A graphic presentation of routine production is shown in Figure 2-9.

Providing that the composite gradation analysis is within the job mix formula limits and the stockpiles are uniform, the minimum test frequency is two (2) composite gradation analysis daily or one (1) per mix type if more than one mix type is produced during the day and the stockpiles tested for uniformity as required.

If the results of a Plant Inspector's composite aggregate gradation show that the material is outside the Job Mix Formula Limits, notify the Producer immediately to inform him that his material may be out of specifications. Obtain another composite aggregate sample and run a gradation test. If this material is within the Job Mix Formula Limits, continue routine testing.

If the second test also shows the gradation to be outside the Job Mix Formula limits, inform the Producer that plant production will not be authorized until satisfactory corrections are made.

2-3.30 BITUMINOUS CONCRETE MIXTURE

In order to determine if the specification requirements for a bituminous mixture are being met, the Plant Inspector is required to determine its temperature, review recordation to determine batching quantities, and sample the mixture so additional testing can be performed.

2-3.31 BITUMINOUS MIXTURE TESTS

The Plant Inspector is responsible for sampling and testing the bituminous mixture for various reasons. The mixture shall be sampled from the delivery vehicle. Some tests are directly related to control testing and others for informational testing.

Minimum routine bituminous mixture sampling/testing frequencies are as follows:

Test	Frequency of Test and/or Sample
Mixture Temperature	Initially, plus periodically
Mixture Moisture	One (1) per day
Bituminous Extraction (Recycle Mixes)	Two (2) per day
Bituminous Extraction (Virgin Mixes)	As established by the Regional Materials Engineer.
Bituminous Mixture Monitoring	One (1) per initial 500 tons and for every additional 1000 tons, or one per day (top courses).

A. Mixture Temperature Test

To assure proper mixing and uniform asphalt coating of the aggregates, the bituminous mixture must be produced at the proper temperature. The proper mixing temperature varies depending on mix type and is determined by the Regional Materials Engineer. The Plant Inspector shall determine the temperature of each mix produced on a daily basis as follows; initially upon production of a mix and routinely thereafter. He shall record temperatures in his diary.

INITIAL ANNUAL PRODUCTION OF EACH MIX TYPE (DRUM MIXER)

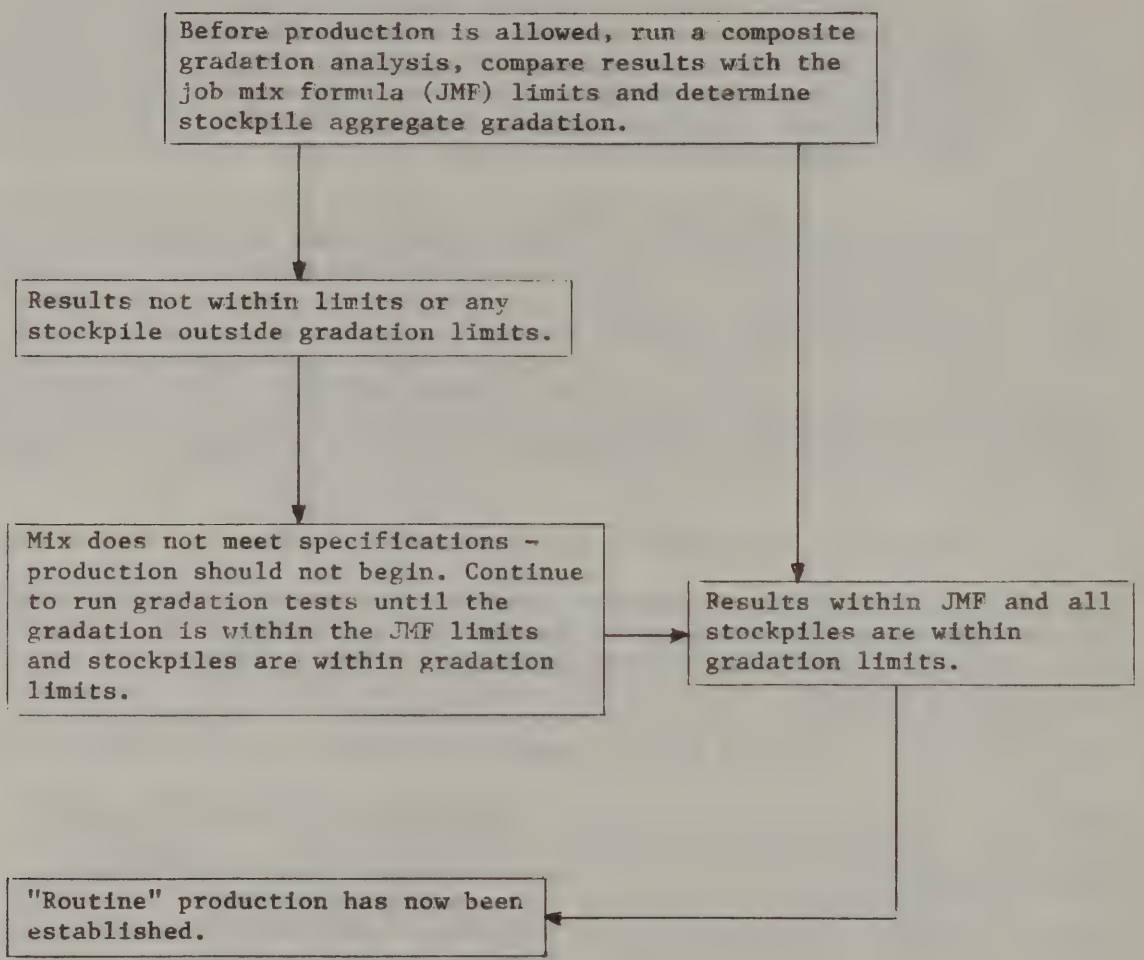


FIGURE 2-8

ROUTINE PRODUCTION (DRUM MIXER)

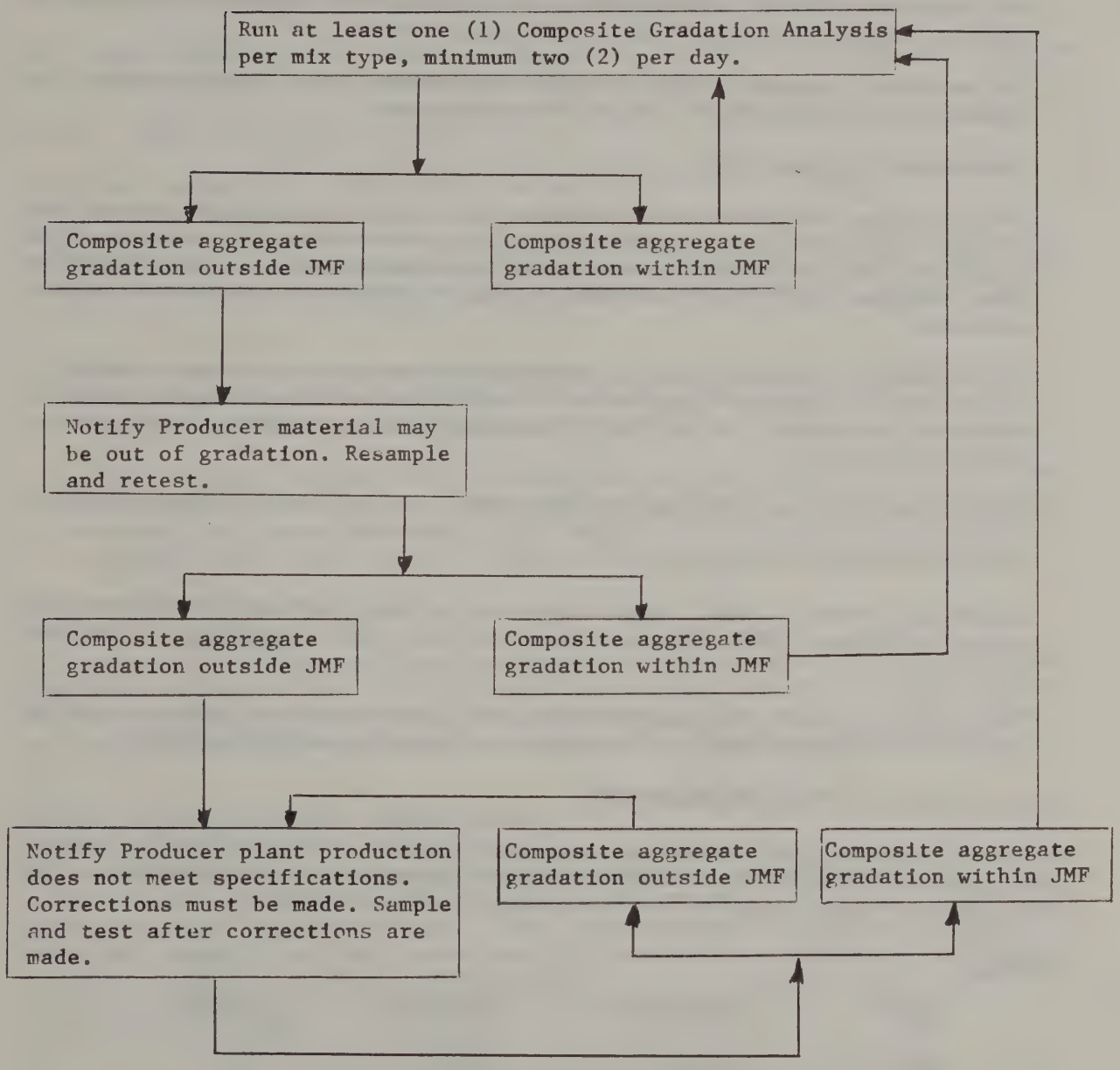


FIGURE 2-9

B. Mixture Moisture Test

This test is required to be performed a minimum of once per day. If excessive mix moisture results are obtained, the testing frequency may be increased as directed by the Regional Materials Engineer.

For each mix produced, the moisture content shall be determined on samples representing mix discharged from the holding bin.

The moisture content of the bituminous mixture shall be determined in accordance with Appendix H - Mixture Moisture Test.

C. Bituminous Extraction Test

The bituminous extraction test indicates the approximate asphalt content and provides aggregate for gradation analysis. It is to be performed on bituminous concrete mixtures containing reclaimed asphalt pavement (RAP) in labs equipped with an acceptable exhaust hood, and approved safety apparatus.

The extraction test may also be performed on virgin mixes when directed by the Regional Materials Engineer. It shall be performed at the regional materials laboratory or at the bituminous concrete plant if the lab is properly equipped.

Testing details are outlined in Appendix I - Bituminous Extraction Test.

D. Bituminous Mixture Monitoring

The Plant Inspector shall sample a minimum of once per initial 500 tons and every additional 1000 tons or once per day all top course bituminous mixtures.

The material shall be sampled from the haul vehicles and prepared in accordance with Appendix J - Bituminous Mixture Monitoring/Sampling.

2-3.32 ASPHALT CONTENT DETERMINATION

The Plant Inspector shall determine the actual asphalt content of the bituminous mixture daily by verifying production recorded quantities (See Example 1). For recycle mixtures see Appendix I - Bituminous Extraction Test.

Example 1

	TIME	AGGREGATE	ASPHALT	% ASPHALT
	1526	2603.1	170.46	6.1
	1531	2640.3	172.91	6.1
5 minute	1536	2677.4	175.36	6.1
interval	1541	2714.6	177.81	6.1
Difference	———	37.2 Ton	2.45 Ton	

$$\text{Asphalt Content (\%)} = \frac{\text{Asphalt Weight (Tons)}}{\text{Aggregate Weight (Tons + Asphalt Weight (Tons)}} \times 100$$

$$= \frac{2.45}{37.2 + 2.45} \times 100 = 6.2\% \text{ (for production from 1536 to 1541 hrs.)}$$

Compare the 6.2% computed from the recordation against that called for on the job mix formula. This should be within 0.1% of the required percent aspahlt. If not, action as stated in Section 2-3.33 below shall be taken.

The Plant Inspector shall determine the asphalt content of each mixture produced daily by checking recorded quantities during production.

2-3.33 BITUMINOUS MIXTURE CONTROL

The bituminous mixture control shall be based upon the following:

1. Temperature - The bituminous mixture must be produced to within ±20°F of the established mix temperature. If loads are outside these limits they shall not be authorized for shipment. Corrective measures shall be taken by the Producer.

2. Mix Moisture - If the moisture content of the mixture exceeds 0.5%, the Plant Inspector shall inform the Producer that plant production will not be authorized until satisfactory corrections are made.

3. Asphalt Content Determination - If review of the recordation reveals that the asphalt content is more than ±0.1% from job mix formula target asphalt content, the Plant Inspector shall notify the Producer that this out of tolerance production will not be authorized.

2-3.40 QUANTITY DETERMINATION

The quantity of bituminous concrete mix to be recorded on the BR-343 (Daily Bituminous Concrete Plant Report) shall be the total weight recorded by either recording truck scale or bin scale and dispatched to the project. This material can include mix moisture up to the maximum allowed by the specifications, i.e, 0.5%.

2-3.50 PROPORTIONING AND MIXING METHODS

The Plant Inspector shall inspect the proportioning and mixing methods used to assure the Department that the materials incorporated into the mixture are properly proportioned and mixed. The proportioning and mixing equipment is inspected annually and then periodically throughout the season by the Regional Materials Engineer or his representative. It is essential that the Plant Inspector be acquainted with all of the equipment and its operation for the plant being inspected.

The drum mix plant proportions uniformly graded aggregates in the proper amounts by fully controllable cold feeders. The total weight of the continuous flow of aggregates from the feeders to the mixer is measured by a weighing belt scale(s). Asphalt cement is pumped continuously into the mixer in the amount required for the proper percentage of asphalt in the mixture. This process goes on simultaneously and continuously until the required amount of mix is produced. The rate at which the mix is produced can be either increased or decreased within the allowable production range determined at the initial plant approval, as the project demands.

2-3.51 MEASURING DEVICES

A. Aggregate

Aggregate proportioning is done volumetrically by varying gate openings and belt feeder speeds for each aggregate bin. The Producer has the responsibility to graph the bins in order to determine how much aggregate comes from each bin with different gate openings and belt feeder speeds.

After proportioning the individual aggregate components as described above, the composite aggregate is continuously weighed over a belt scale to determine production quantities.

B. Mineral Filler

Mineral filler, if required, is incorporated into the mixture through a system separate from the aggregate feed bins. This system usually consists of a storage silo, a proportioning device like an automatically adjustable vane feeder and piping which injects the mineral filler in the drum near the asphalt cement injection point.

C. Asphalt Cement

The asphalt cement is proportioned by metering. The proper quantities to be metered are calculated internally within the system by incorporating the belt scale aggregate quantity (tons per hour), aggregate moisture content, and desired asphalt content percent (based on total weight of mix).

D. Accuracy

All aggregate feeders, belt scales, asphalt meters and truck or hopper scales shall meet the requirements given in Section 401 of the Standard Specifications.

2-3.52 AUTOMATIC PROPORTIONING CONTROLS

All proportioning controls for aggregates, including mineral filler, and asphalt cement shall be located at the panel which also controls the mixer and temperature. The panel shall have a production setting which will increase or decrease the production rate without having to reset the individual settings for each material. Whenever the flow of any of the materials is interrupted the system shall automatically shut down.

A. Control Panel

The major components of a control panel and their functions are described in this section. The features of a typical drum mixer are shown in Figures 2-10a, 2-10b, and 2-10c.

1. Aggregate Feed Rate Settings - The panel shall have adjustable feed rate settings for each aggregate bin feeder and mineral filler feeder.

2. Aggregate Weight Indicators - Weight indicators shall display on the control panel displaying the weights of dry aggregate and mineral filler in tons and shall continuously accumulate the weights of material during the production period in the day.

3. Aggregate Moisture Compensator - The moisture compensator shall be capable of electronically changing the wet weight of aggregate to dry aggregate weight. The compensator is set based on moisture tests performed on composite aggregate samples. The maximum graduation of a compensator shall be 0.1%.

4. Asphalt Setting - The asphalt setting shall be accommodating the actual asphalt content directly as a percentage based on total weight of mixture. The maximum graduation of the asphalt setting shall be 0.1%.

5. Production Setting - The panel shall have a master production setting to control the production rate of the plant. The individual material feed rates are automatically increased or decreased proportionately as the production setting is adjusted.

6. Keyboard - Some computer panels allow input of all the above settings through a keyboard. The production rates may be inputted as percentages of the total production.

B. Proportioning Tolerances

1. Aggregate - The aggregate proportioning controls shall maintain an aggregate flow accuracy such that the total variation of all aggregates being drawn per interval of time shall not exceed an amount equal to 1.5% of the total weight of bituminous mixture per interval of time.

2. Mineral Filler - Where separate addition of mineral filler is required, it shall be added with a maximum variation of 0.5% on the basis stated above for aggregates.

3. Asphalt Cement - The asphalt delivery system shall be coupled with the aggregate delivery system to automatically maintain the required proportions as the aggregate flow varies. The delivery tolerance for asphalt shall be ±0.1% of the total mixture weight.

C. Proportioning Interlocks

The aggregate and mineral filler bin feeders shall be interlocked so that production is interrupted within five (5) seconds if any active cold bin becomes empty or the flow of material is obstructed.

The Asphalt Delivery System shall be interlocked so that production is interrupted within five (5) seconds if the asphalt flow to the mixer ceases.

2-3.53 RECORDER

Recordation equipment shall be used to provide the Department with a visual record of the materials incorporated into the bituminous concrete mixture. The recorder shall be digital and capable of automatically and simultaneously recording the accumulated weights of dry aggregate, mineral filler if added separately, and asphalt at five (5) minute intervals during production and on demand. The recordation shall include the actual asphalt content based upon the total mixture weight. The maximum resolution shall be 0.1 tons for dry aggregate, 0.01 tons for mineral filler if added separately, 0.01 tons for

asphalt cement, and 0.1% for mix asphalt content. All recordings shall show the date, including day, month and year, and time to the nearest minute for each print. The Plant Inspector shall be provided with a clear and legible copy of the recording. Figure 2-11 shows a typical copy of recordation.

The recorder should be checked periodically to assure that the recorder is printing within one unit of the corresponding accumulator.

2-3.60 MIXER UNIT

The drum mixer shall be of a type approved by the Director, Materials Bureau, having an automatic burner control and capable of producing a uniform mixture within the job mix tolerances.

2-3.70 PRODUCTION INSPECTION AND CONTROL

Drum mix plants can produce large quantities of mixture in a short time. For this reason, production errors can quickly produce considerable amounts of out of specification material. An adequate inspection and testing program can assure the Department that specification material is being produced.

The Plant Inspector must take the necessary steps to assure that production of the bituminous concrete mixtures are within Department specifications. In addition to the requirements outlined in the preceding sections, the following procedures must be done on a daily basis:

Prior to Production

1. Check to see that the aggregate cold feed bins are properly identified and that the proper source and size aggregates are in the bins.

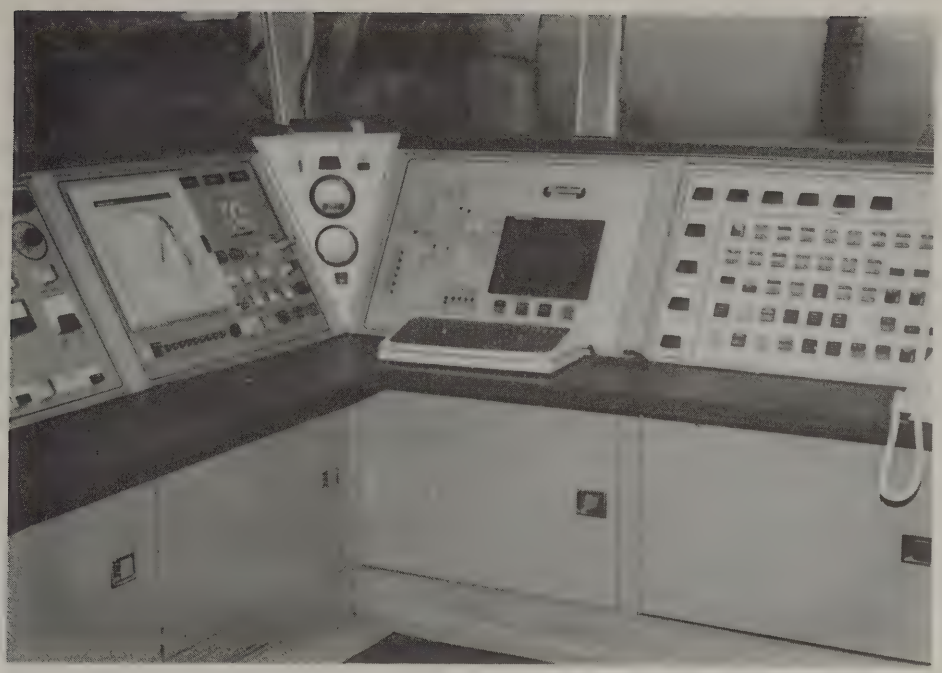
2. Watch the cold feed gate settings to see that they match the mix to be produced at the anticipated production rate. The allowable gate settings are listed in the initial approval letter.

3. Check to see that the belt scale is warmed up for at least 15 minutes prior to starting production. Check to see that the scale reads zero with no load and that the span setting has not been changed from what was determined during the last belt scale test. This is important because any change in the span setting causes the scale accuracy to change.

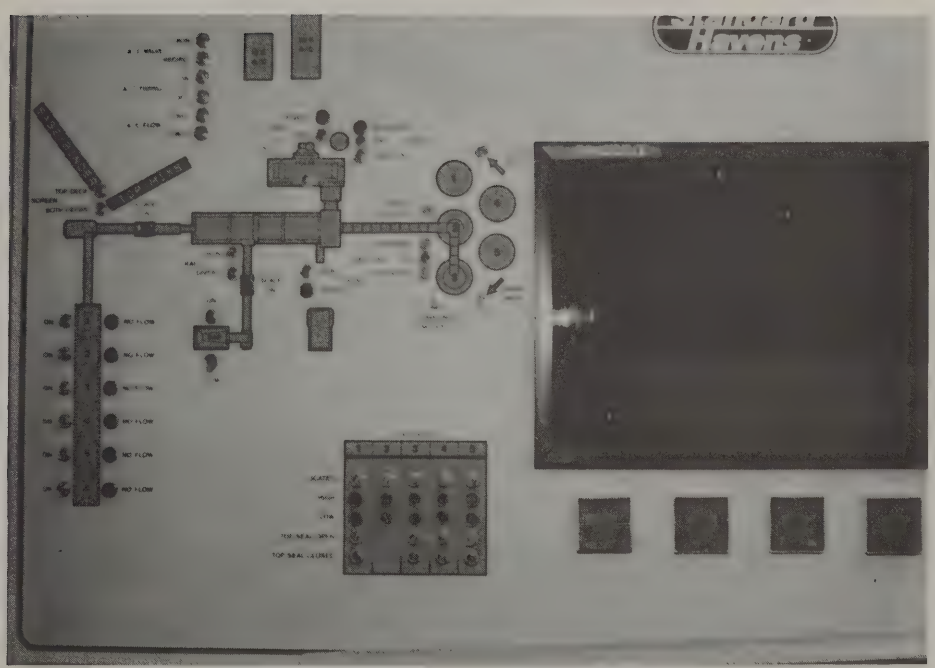
4. Check the temperature of the bituminous material in plant feed line. The material must be within ±25°F of the temperature at which the meter was calibrated.

5. Watch to see that the cold feed settings for aggregate and mineral filler (if added separately) are preset into the automation system for proper proportioning. This shall be done in conjunction with the inspection of the cold feed gate settings. It may be necessary for the plant to be running to check this.

6. Check that the proper asphalt percentage is input into the automation system. This includes checking that the correct asphalt specific gravity (or pounds per gallon) is also input.



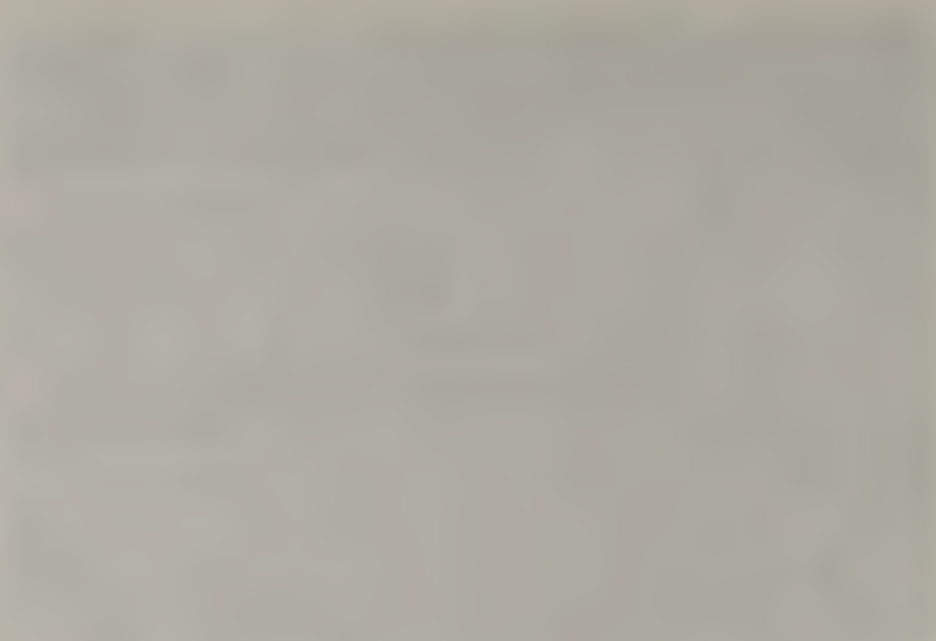
TYPICAL DRUM MIX PANEL

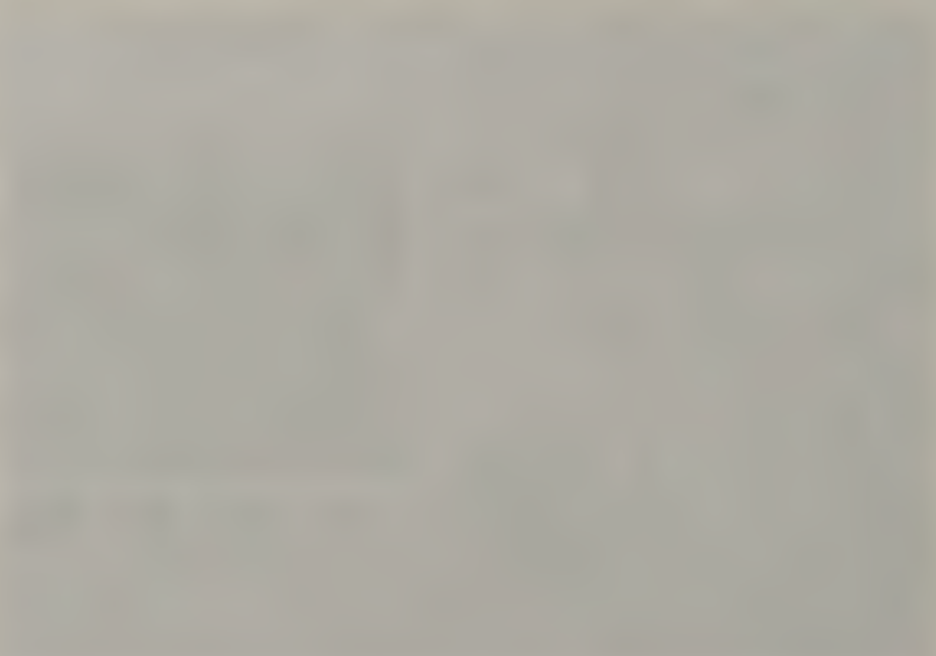


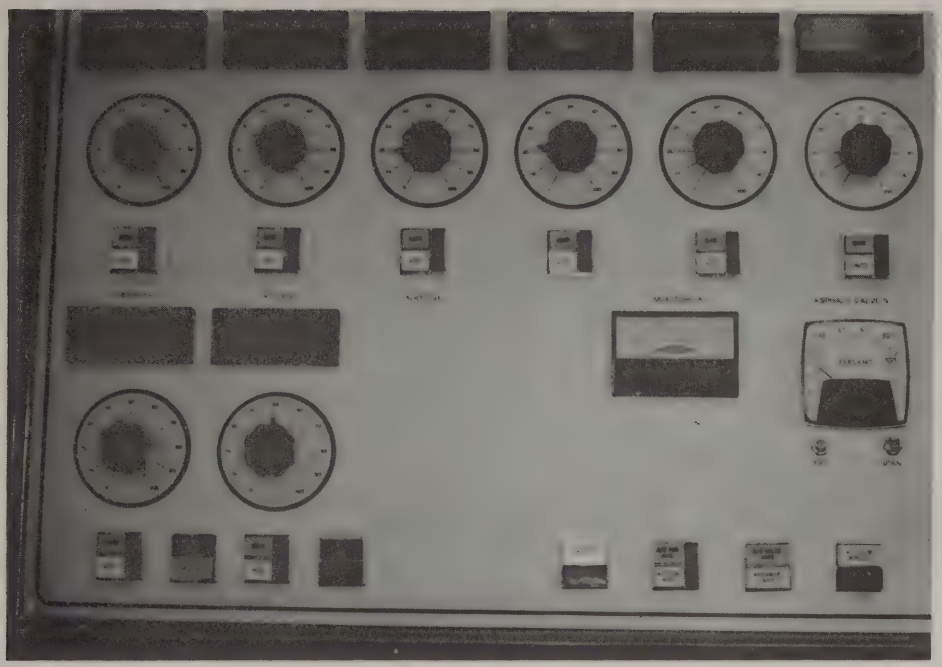
PLANT EQUIPMENT LAYOUT

PRODUCTION INPUT AND DISPLAY SCREEN

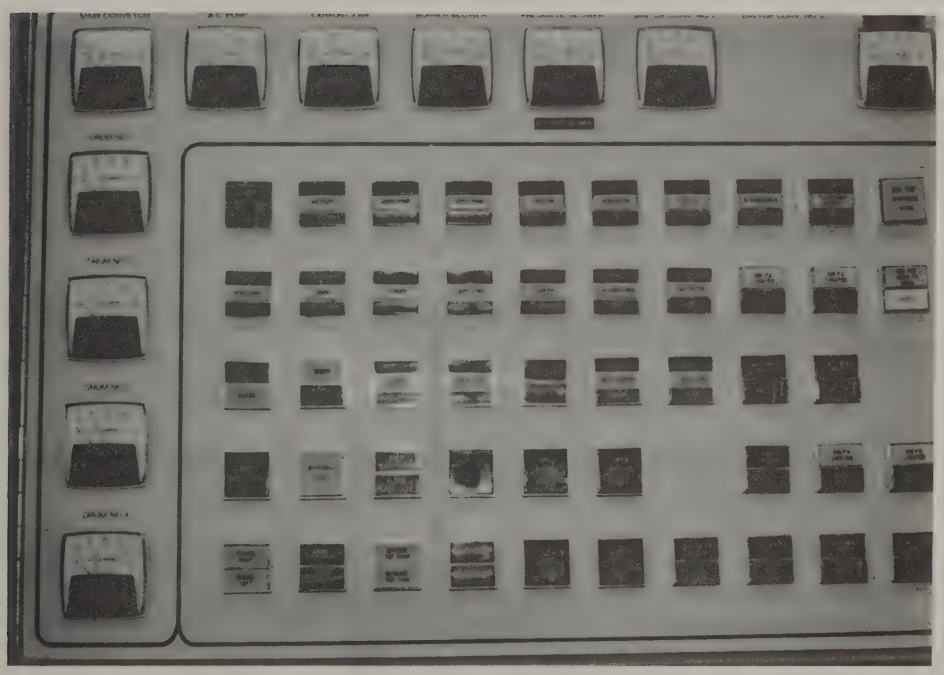
FIGURE 2-10a





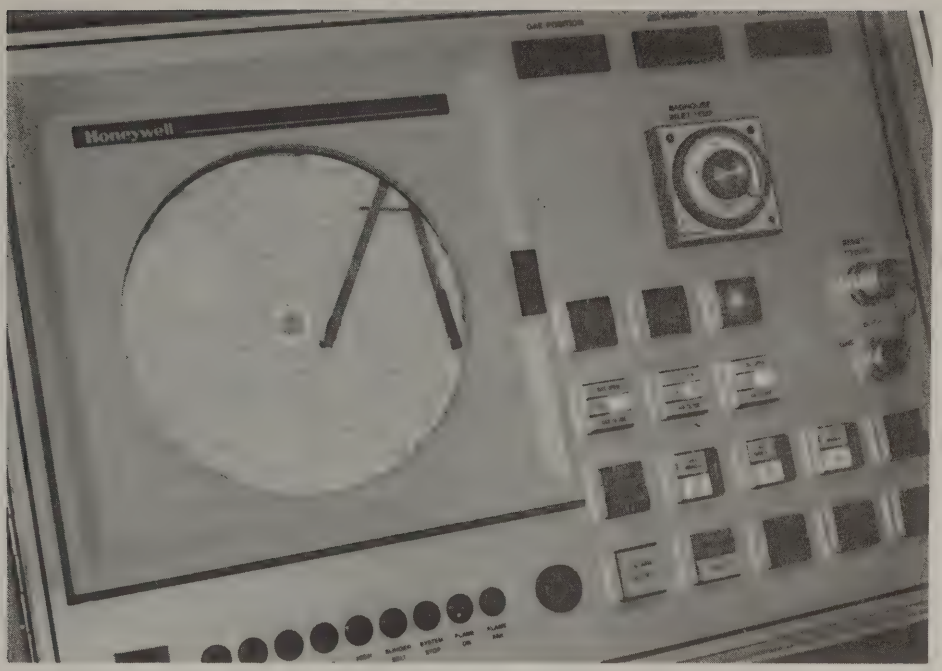


AGGREGATE AND ASPHALT INPUT PANEL

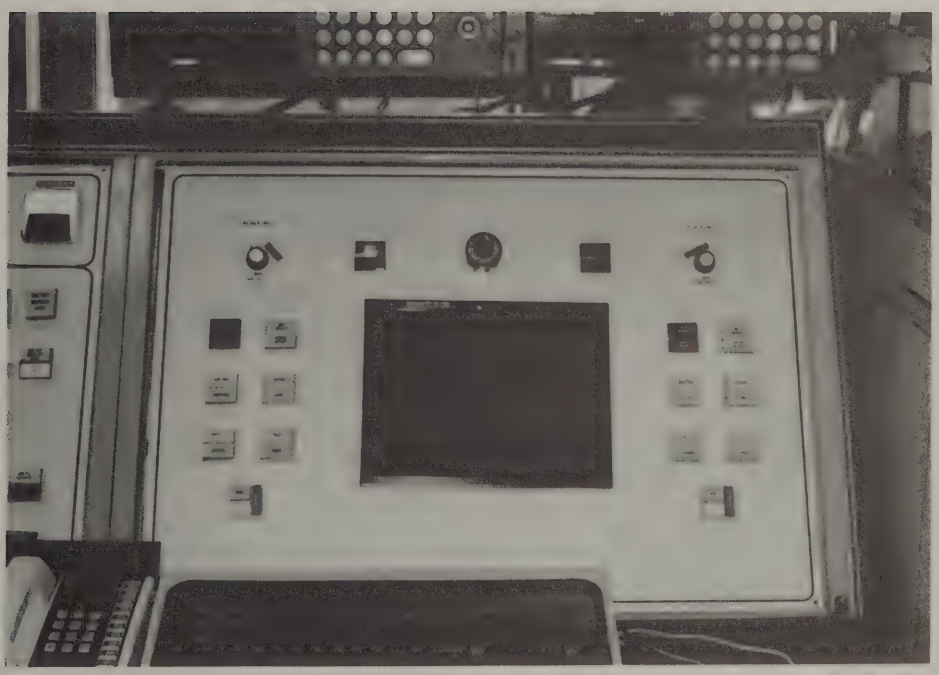


PLANT EQUIPMENT CONTROL PANEL

FIGURE 2-10b

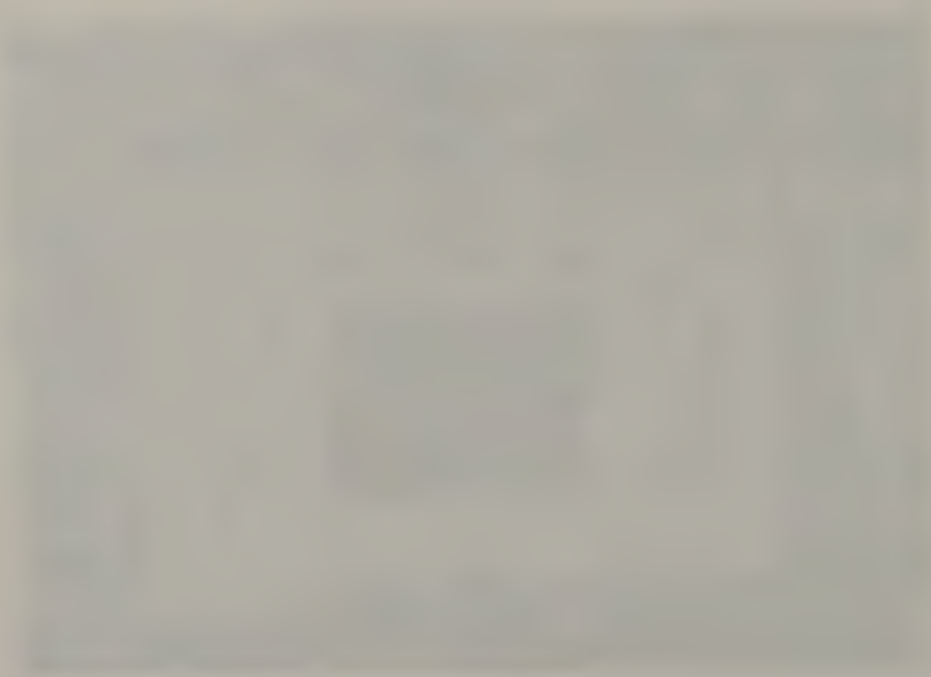


BURNER CONTROL PANEL



STORAGE SILO LOAD-OUT SYSTEM

FIGURE 2-10c



TIME 13:46 DATE 8/02/84

PRODUCTION RATE	255	TPH
ASPHALT	7.7	TPH
AGGREGATE	247	TPH
RECYCLE	0	TPH
FILLER	.0	TPH
FEEDER #1	36	TPH
#2	0	TPH
#3	0	TPH
#4	31	TPH
#5	88	TPH
#6	88	TPH
ACTUAL A/C	6.02	%
MIX TEMP.	283	
STACK TEMP.	291	
ASPHALT TEMP.	306	
MOIST. CONTENT	2.1	%
FEEDER #1 TONS	236.5	
#2 TONS	64.7	
#3 TONS	91.9	
#4 TONS	116.3	
#5 TONS	126.8	
#6 TONS	188.2	
AGGREGATE TONS	831.7	
RECYCLE TONS	.0	
ASPHALT TONS	41.18	
PRODUCTION TONS	873	

FIGURE 2-11

7. Make sure the composite aggregate moisture content is correctly preset.

8. Check to see that all aggregate and asphalt weight accumulators are reset to zero and functioning properly. These should be reset to zero daily or whenever a change in mix type is made during the day.

9. Be certain that aggregate, mineral filler (if used) and asphalt interlocks are turned on.

During Production

1. Observe all automatic proportioning controls and recordation soon after production begins to see if they are working properly.

2. Be certain that during all production start ups and shutdowns the waste mix is separated from the mix meeting specifications.

3. Check to see that the correct mix goes into the correct bin on multiple holding bin systems. Only one mix type shall be placed in any individual bin.

4. Check to see that the plant is producing within the Department approved range. This is listed in the plant approval letter.

5. Check to see that recording truck or holding bin scale(s) are operating properly, i.e. no printing occurs if scale is in motion and at least two of the three required weights (gross-net-tare) are printed along with the required time-date information.

6. If a recording truck scale is used and trucks are not tared prior to each loading, see that each truck is weighed empty at least twice a day for tare weight.

7. Determine mix temperature after it is discharged from the holding bin. This shall be within 20°F of the temperature specified.

2-3.71 EQUIPMENT MALFUNCTIONS AND BREAKDOWNS

When a breakdown occurs the Plant Inspector shall notify the Regional Materials Engineer. If the bituminous concrete production is interrupted or the quality is affected by the breakdown, the Plant Inspector may also notify the Project Engineer per Regional policy. The Regional Materials Engineer may allow the Producer to produce bituminous concrete for a period not exceeding 48 hours from the time of breakdown providing that specification material can be produced and recorded automatically or manually. The 48 hours are two consecutive calendar days excluding Sundays and New York State legal holidays. Written permission of the Regional Director will be required for the Producer to operate in the breakdown mode for periods longer than 48 hours.

In some cases it may be possible for the Producer to correct the problem in a short period of time. It is the Plant Inspector's responsibility to determine the seriousness of the trouble and notify the Regional Materials Engineer if in doubt to determine whether it is necessary to enter the 48 hour breakdown period.

PLANT INSPECTOR'S CHECKLIST

Materials

1. Do you have an aggregate certification from the Producer showing all the required information?
2. Are the aggregate stockpiles identifiable and separated by sources and sizes?
3. Have you performed tests on the aggregates
   - before production starts?
   - before starting after a shutdown?
4. Do you understand the start-up and routine control diagrams shown in Figures 2-8 and 2-9?
5. Do you have asphalt cement delivery forms to certify you are using acceptable asphalt?

Production

7. Have you checked with the Regional Materials Engineer to find out if the plant equipment has limitations?
8. Have the scales and meters been tested for accuracy recently?
9. Are the design weights properly programmed into the control panel?
10. Do you know the codes on the recordation?
11. Do you know what information is required on the recordation?
12. Do you know what a breakdown is and when the 48 hour breakdown period begins and ends?
13. Do you approve of the condition of the haul units?
14. If storage bins are used do you know their limitations?
15. Are the aggregate, mineral filler (if used), and asphalt flow interlocks functioning properly?
16. Has the composite aggregate moisture content been determined and preset into the control panel?
17. Has the belt scale been warmed up for at least 15 minutes prior to starting production?
18. Is the bituminous material within ±25°F of the calibrated feed line temperature?
19. Are the aggregate and asphalt weight accumulators and recorder reset to zero prior to production or whenever a change in mix type is made?

SECTION 3

ADMINISTRATIVE PROCEDURES AND RECORD KEEPING

3-1 GENERAL

The Plant Inspector is responsible for maintaining a diary, test records, production records and authorizing shipment of production to projects. These records along with the material certifications and job mix formulas shall be kept on file at the plant in an orderly manner so they can be readily consulted. The diary shall be used to record miscellaneous test data and information, and to record conversations between the Plant Inspector and Producer, Project Engineer, Regional Materials Engineer or other pertinent personnel.

3-2 DELIVERY TICKET

Regardless of the payment or recording system in use, each truckload of bituminous concrete arriving at Department projects must be accompanied by a delivery ticket prepared by the Producer which includes the following minimum information:

1. Delivery Ticket Number
2. Plant Identification
3. Contract Number
4. Material Type
5. Quantity of material in truck
6. Date and Time

The Plant Inspector shall ensure delivery tickets have the required information for each project served by spot-checking.

3-3 PRODUCTION RECORDS

The authorization of bituminous concrete to be dispatched from the plant is based on evidence that the materials used in the mix were approved and that they were properly proportioned. Routine tests of the bituminous concrete mixture to determine shipment authorization include temperature determination. In addition the asphalt content of the mixture shall be determined by calculating the asphalt percentage from the recorded weights. The quantity of authorized production is determined from records containing this information.

3-3.10 MATERIALS RECORDS

The records that the Plant Inspector shall keep on file at the plant during production, relating to material and equipment approval are as follows:

1. Plant Approval Documentation for Current Year
2. Job Mix Formulas
3. Aggregate certifications
4. Bituminous Materials Certified Shipment Notice, BR-162c, or equivalent
5. Sampling and Testing Records
6. Daily Bituminous Concrete Plant Report Form, BR-343

3-4 DAILY BITUMINOUS CONCRETE PLANT REPORT

A bituminous concrete plant report (BR-343) for bituminous concrete produced and authorized to be shipped to each project shall be completed by the Plant Inspector at the end of the day. The Plant Inspector shall issue a copy of the report to each project served by the plant and retain the original for the plant records. The report shall be forwarded to the projects not later than the morning following the production date.

The reports shall be numbered consecutively by the Plant Inspector with Report 1 beginning on the first production day of any calendar year. A sample copy of the report is shown in Figure 3-1.

3-5 ACCEPTANCE OF MISCELLANEOUS QUANTITIES BY PRODUCER'S CERTIFICATION

When it is not feasible to provide plant inspection for miscellaneous quantities, the Regional Materials Engineer and the Project Engineer may agree to accept bituminous concrete from an approved plant on the basis of a Producer's Certification stating that the bituminous concrete conforms to specification. The certification shall be Form BR-342, Materials Certification completed by the Producer as shown in Figure 3-2.

In addition, the recordation for all certified material shall be maintained at the plant unless otherwise directed by the Regional Materials Engineer.

PLANT INSPECTOR'S CHECKLIST

1. Are your daily records neat, legible and properly filed?
2. Are you spot checking the delivery tickets to determine if they contain proper information?
3. Do you know what acceptable bituminous concrete is?
4. Have you reviewed the recordations and identified the loads according to mix type and project destination?
5. Does the quantity listed on Form BR-343 represent only authorized material?

BR 343 (9/77)

DAILY BITUMINOUS CONCRETE PLANT REPORT

SHEET 1 OF 1

REPORT NO.	DATE	REGION	PLANT CODE NO.
97	10/8/86	1	10018

PLANT: Wonder Paving Materials — SURGE BIN USED: ☒ YES ☐ NO

LOCATION: Colonie, N.Y.

APPROVAL FOR PAYMENT: ☐ THEORETICAL WT. ☐ RECORDED WT. ☒ TRUCK WT.

JOB STAMP

AUTHORIZED SHIPMENTS

PROJECT D500065		PROJECT D251152		PROJECT		PROJECT	
MIX TYPE	QUANTITY	MIX TYPE	QUANTITY	MIX TYPE	QUANTITY	MIX TYPE	QUANTITY
6F Top	300.3T	Dense Base	147.3T				
		Dense Binder	48.2T				

PROJECT		PROJECT		PROJECT		PROJECT	
MIX TYPE	QUANTITY	MIX TYPE	QUANTITY	MIX TYPE	QUANTITY	MIX TYPE	QUANTITY

REMARKS:

PLANT INSPECTOR (SIGNATURE): J. Buckley

PROJECT REVIEWER (SIGNATURE):

FIGURE 3-1

BR 342 (10/77)

MATERIALS CERTIFICATION

☐ Portland Cement Concrete

☒ Asphalt Concrete

JOB STAMP

SHIPPED FROM:
Plant YEX BLACKTOP CO. Plant No. 10025
Location SYRACUSE, N.Y. Region 3
Shipping Date 5-15-86

SHIPPED TO:
Project No. D995760
Location LAWSON ROAD

Class/Mix Type*	Quantity
6F TOP	26 TONS

*Use Item Number when material is not designated by Class/Mix Type.

I certify that the material delivered with the delivery ticket to the above noted project was proportioned in accordance with the requirements of the contract specifications for the specific class/mix/item noted using New York State Department of Transportation approved materials.

By B. C Mix
Title PLANT SUPERINTENDENT Date 5-15-86

FIGURE 3-2

SECTION 4

APPROVALS

4-1 GENERAL

The bituminous concrete plant, including testing facility shall be inspected and approved by the Department prior to initial production, and annually thereafter. Movement of a previously approved plant to a new location and/or changes in equipment shall require a reinspection. The approvals shall be granted to the Producer upon compliance with the specifications. The approval procedures are described in this section.

The Regional Director may at anytime discontinue the use of previously approved equipment if non-conformance with the specifications result during the progress of the work. When the Regional Director discontinues the approval, the equipment will not be acceptable for Department work until corrections are made by the Producer. The Regional Director may then reinstate the approval.

4-2 INITIAL APPROVAL

Initial plant installations including new locations and/or automation changes shall be inspected and approved by the Director, Materials Bureau. However, before production can begin an annual approval must be obtained.

4-3 ANNUAL APPROVAL

The plant inspection shall be performed by the Regional Materials Engineer or his representative. The requirements for the plant and testing facility are given in Section 401 of the Standard Specifications.

The inspection results shall be recorded on Form BR-278, Annual Inspection Record - Bituminous Mixing Plant and submitted to the Materials Bureau for review. Plants found acceptable in the review will be approved by the Director, Materials Bureau. Upon approval, two copies of the report stating limitations, if any, will be returned to the Region Office; one copy to be filed at the bituminous concrete plant.

Subsequent annual inspections where the plant is found to be acceptable and where no equipment changes have been made shall be recorded on page 1 of Form BR-278. The one page report shall be processed as stated above.

4-3.10 AUTOMATIC PROPORTIONING AND RECORDING CONTROLS

The automatic proportioning and recording equipment shall initially be inspected by personnel from the Materials Bureau after the equipment is installed, but before the plant produces bituminous concrete for Department work. At the time of the inspection, the Producer shall have available a person capable of making adjustments to the automatic controls. This would normally be a manufacturer's representative of the company making the control equipment.

After the automatic proportioning and recording equipment is found acceptable, the automation system will be approved in writing by the Director, Materials Bureau.

After the initial inspection, further inspections shall be made by the Regional Materials Engineer or his representative during the annual inspection for plant approval or at any other time the Regional Materials Engineer or his representative deem necessary.

A reinspection of approved automatic proportioning and recording equipment is required to be made by Materials Bureau personnel when major changes are made in the scales, proportioning controls or recorder or if requested by the Regional Materials Engineer.

4-3.20 JOB MIX FORMULA APPROVAL

Job mix formulas from each plant for each mix type which satisfy the general limits of the specifications are prepared by the Producers of bituminous concrete each year prior to the start of production. The Producers submit the formulas on Department forms to the Regional Office having jurisdiction over the plant. For any standard mix listed in Table 401-1 of the Standard Specifications, except for those requiring high friction aggregates, the Regional Director shall review the submitted formulas and grant approval when all requirements are satisfied. For mixes requiring high friction aggregates, recommendations indicated by the Regional Director's signature, shall be sent to the Materials Bureau for approval. Once approved, four (4) copies of each formula (or more if specified by the Region) are distributed as follows: Materials Bureau, Region Office, Plant Inspector, Producer.

All approved job mix formulas have tolerances that establish the limits which the Producer must meet when producing bituminous concrete. In no case shall a job mix formula have tolerances that allow the job mix limits to fall outside of the general limits. The aggregate tolerances are based upon total weight of the aggregate and allow for variations in production. The asphalt content, however, is based upon total weight of the batch and has an approved range so that the batching percentage may be varied within the limits by the Region to obtain a mix with desired properties.*

Production of any mix for Department projects shall not be authorized unless an approved formula for that mix is on file at the Plant Inspector's office.

Occasionally changes in aggregate sources, aggregate characteristics and/or plant equipment during production periods may require the Producer to change the job mix formula. Such changes, may be temporarily approved by the Regional Director until the new formula has been approved or rejected by the Director, Materials Bureau. Temporary approval should be granted only in those cases where a change is absolutely necessary to continue production and shall be immediately withdrawn if the new mix exhibits any signs of unsatisfactory behavior. Mixes requiring Marshall Mix Design as specified, may be given tentative approval as outlined in Materials Method 5.13, Marshall Mix Design for Asphalt Concrete Mixes.

Should the Region desire additional engineering information regarding any particular mix, specific instructions as to sample size and submission will be issued by the Materials Bureau upon request.

* No mix formula which requires Marshall Mix Design by specification shall be changed with respect to percent asphalt content, or use different aggregate sources than those originally approved, without approval of a new job mix formula and concurrent Marshall submittal.

APPENDICES

APPENDIX A

SAMPLING OF AGGREGATES

A. SCOPE

This method prescribes procedures for obtaining and preparing a sample of aggregate that represents the material being used in the bituminous concrete.

B. GENERAL

The Regional Materials Engineer shall choose one of the sampling points given below for each plant. In choosing the sampling point, safety of the Plant Inspector shall be taken into consideration. The Plant Inspector shall obtain samples from the selected point according to these procedures.

C. EQUIPMENT

The following equipment is generally used for sampling:

1. Pails
2. Square Shovel
3. Brush
4. Sample Splitter with pans

D. SAMPLING PROCEDURES

1. Stockpile Sampling

   a. Small Conical Stockpiles - The sample shall be composed of material sampled from at least nine (9) points in the stockpile. Samples shall be taken at one-third (1/3) points around the pile and at three (3) levels (base, middle, and top). At each point, the face shall be exposed to a minimum depth of one (1) foot before sampling. Care shall be taken so that aggregate adjacent to the sampling point does not fall into the sampling area.

   b. Other Stockpiles - The details for conical stockpiles shall apply except that the sample shall be composed of material sampled from at least six (6) points in the area of the stockpile being used for production. Samples shall be taken from two (2) locations and at three (3) levels, (base, middle, and top).

2. Belt Sampling (Drum Mix Plants) - A composite aggregate sample shall be obtained by using an automatic aggregate sampling device which diverts a representative combined aggregate sample into a hopper or container. The device shall sample the full width and depth of the aggregate flow without losing any portion of the sample. The sampling point shall be after all the aggregate is proportioned and prior to its mixing with asphalt cement.

3. Hot Bin Sampling - Samples shall be obtained with a sampling device that allows gathering of representative samples from the full width and depth of the discharge area from each aggregate hot bin while the plant is in operation. The device shall consist of a sampling tray of adequate capacity which is structurally supported during the sampling operation. A shovel is not satisfactory for this purpose.

E. SAMPLE SIZE

The amount of aggregate required for a representative sample and the size of sample for testing are given in the respective test methods.

When a non-standard aggregate size is used, the sample size shall be that of the closest standard primary size.

F. SAMPLE PREPARATION

In order to obtain a convenient sample size for sieving, or for other tests, a large sample may be reduced by a sample splitter or by quartering.

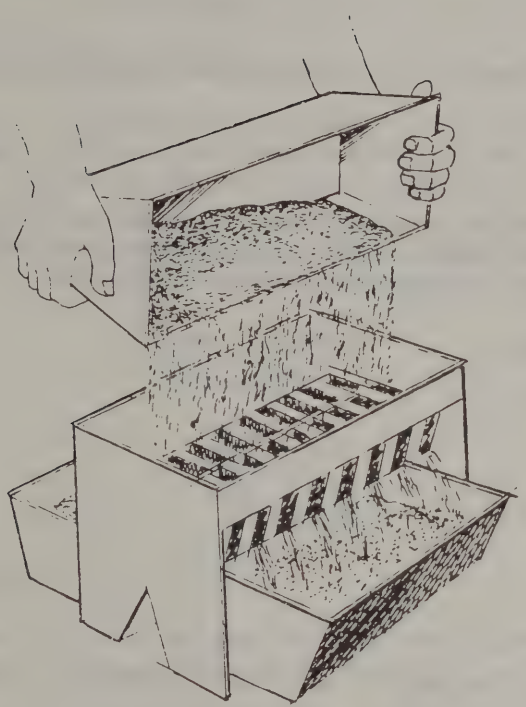
When using a sample splitter, the original sample shall be split into two (2) fractions. If one of these fractions is too large for testing, a fraction can be split again. This splitting procedure can be used until the proper size sample for testing is achieved.

If a sample splitter is not available, the sample shall be reduced by quartering using the following method:

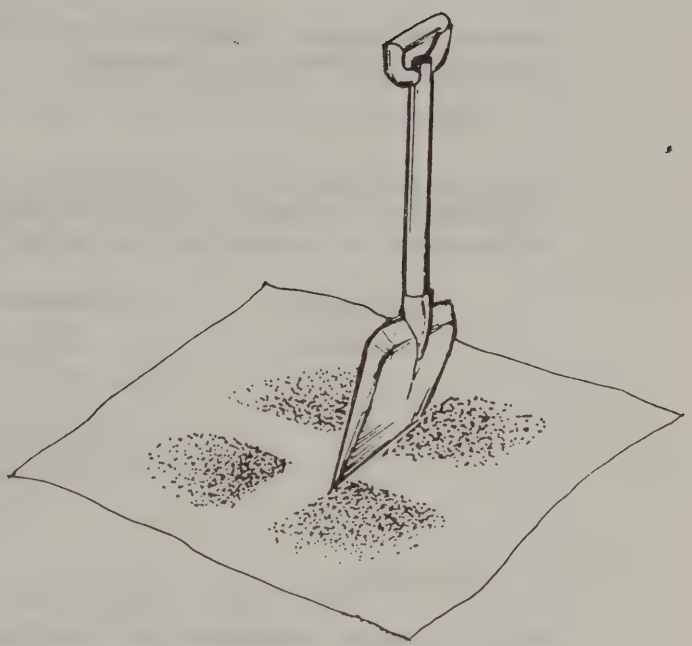
1. Distribute a scoopful of the aggregate as uniformly as possible over a wide, flat area on a tight weave canvas, or other smooth surface. Continue to distribute scoopfuls of aggregate in layers until all of the aggregate is used to make a wide, flat pile that is reasonably uniform in thickness and distribution of aggregate sizes. Do not permit coning of the aggregates.

2. Divide the sample into equal quarters with a square end shovel, trowel or straight piece of sheet metal. Discard two (2) opposite quarters and combine the remaining quarters taking care to include the dust and fines with each quarter. If necessary, this procedure is repeated until the sample size has been reduced sufficiently.

Figure A-1 illustrates both techniques for reducing the sample size.



Splitting a sample with a sample splitter



Quartering a sample with a square end shovel on a piece of canvas

FIGURE A-1

APPENDIX B-1

STOCKPILE GRADATION TEST - COARSE AGGREGATE

A. SCOPE

This test method prescribes the procedures for determining the gradation of coarse aggregates for individual aggregate sizes used in bituminous concrete.

B. GENERAL

Coarse aggregate gradations shall be determined at frequencies established by the Regional Materials Engineer.

C. SAMPLE

The samples shall be obtained and reduced to testing size in accordance with Appendix A - Sampling of Aggregates. The amount of aggregate required for a representative sample and the size of sample for testing are as follows:

Aggregate Size	Original Sample Lbs., Min.	Test Sample Lbs., Min.
#3	80	20
#2	80	20
#1	40	10
#1A	20	10
#1B	10	1½

D. EQUIPMENT

The following equipment is required for the coarse aggregate gradation test:

1. Power driven coarse aggregate sieve shaker with appropriate sieves and timer
2. Large capacity scale
3. Oven or hot plate
4. Pans
5. Brush
6. Stirring spoon

E. TEST PROCEDURE

1. Dry the test sample to a constant weight.

NOTE: The Regional Materials Engineer may permit the Plant Inspector to test the No. 3 and/or No. 2 size aggregate for gradation without drying the aggregate to a constant weight providing that the aggregate is relatively free of moisture. Indicate on the gradation form if the sample was not dried, i.e., "not dried".

2. Weigh the test sample to the nearest 0.01 pounds.

3. Sieve the test sample using the sieve sizes for the particular aggregate for at least five (5) minutes. Do not combine different samples and do not overload the sieves. As a guide, any sieve loaded with more than a single layer of aggregate at the end of the test is overloaded. When overloading occurs, sieve only portions of the sample at a time, and combine like sizes after sieving.

4. Weigh the material retained on each sieve and pan to the nearest 0.01 pounds and record the retained weights. The total of the retained weights should agree within 0.3% of the original sample weight determined in Step 2.

F. CALCULATIONS

The calculations needed to determine the coarse aggregate gradation are described by the example given below. The example shows the calculation for the gradation of an individual aggregate size.

Example: A sample of No. 1 size aggregate has been sieved and the weights of retained material are as follows:

Sieve	Weight Retained
1"	0 lbs.
1/2"	0.92 lbs.
1/4"	18.18 lbs.
PAN	1.39 lbs.
TOTAL	20.49 lbs.

Step 1

The retained weights are expressed as percentages of the total weight:

$$\tfrac{1}{2}\text{" Sieve \% Retained} = \frac{0.92}{20.49} \times 100 = 4.5\%$$

$$\tfrac{1}{4}\text{" Sieve \% Retained} = \frac{18.18}{20.49} \times 100 = 88.7\%$$

$$\text{PAN \% Retained} = \frac{1.39}{20.49} \times 100 = 6.8\%$$

Step 2

The gradation of the aggregate in terms of percent passing each sieve are obtained by adding cumulatively, beginning with the smallest sieve.

1/4" % Passing = 6.8
1/2" % Passing = 6.8 + 88.7 = 95.5%
1" % Passing = 95.5 + 4.5 = 100.0%*

*The total cumulative percent passing may sometimes be within one or two tenths of 100.0% due to calculation rounding. This is acceptable.

G. REPORT

The coarse aggregate gradation test results shall be reported on form BR-159. It should be noted that the aggregate job mix tolerances are expressed to the nearest whole percent. Therefore, in determing whether or not a gradation is acceptable, the combined results are to be rounded off to the nearest whole percent.

H. ACTION

The coarse aggregate gradation test results shall be compared to the original stockpile gradation prior to production. Actions to be taken by the Plant Inspector are as outlined in Section 2-3.

APPENDIX B-2

STOCKPILE GRADATION TEST - FINE AGGREGATE

A. SCOPE

This test method prescribes the procedure for determining the gradation of the fine aggregate used in bituminous concrete.

B. GENERAL

Fine aggregate gradations shall be determined as often as necessary to assure uniformity.

C. SAMPLE

The sample shall be obtained and reduced to testing size in accordance with Appendix A - Sampling of Aggregates. The amount of aggregate required for a representative sample is a minimum of ten (10) pounds and the sample size required for testing shall be 500 grams to 1000 grams.

D. EQUIPMENT

The following equipment is required for the fine aggregate gradation test:

1. Independently power driven fine aggregate sieve shaker with appropriate sieves and timer
2. Small capacity scale
3. Oven or hot plate
4. Pans
5. Brush
6. Stirring spoon

E. TEST PROCEDURE

1. Dry the test sample to a constant weight.

2. Weigh the test sample to the nearest 0.1 gram.

3. Sieve the test sample using a nest of 8" diameter sieves (1/4", 1/8", #20, #40, #80, #200 and PAN) and shake for at least ten (10) minutes. Do not overload the sieves. As a guide, when the #80 and/or #200 sieves are loaded in excess of 200 grams and/or any of the remaining sieves retain more than 300 grams of material at the end of the test is considered overloaded. When overloading occurs, sieve only portions of the sample at a time, and combine like sizes after sieving.

4. Weigh the material retained on each sieve and pan to the nearest 0.1 gram and record the retained weights. The total of the retained weight should agree within 0.3% of the original sample weight determined in Step 2.

F. CALCULATIONS

The calculations needed to determine the fine aggregate gradation are described by the example given below.

Example - A sample of fine aggregate has been weighed at 693.2 grams and sieved. The weights of retained material are as follows:

Sieve	Weight Retained (GMS)
1/4"	0.0
1/8"	37.0
#20	294.1
#40	169.2
#80	123.9
#200	56.8
PAN	12.0
TOTAL	693.0

Original Weight = 694.2
Sieved Total Weight = 693.0
Difference = 1.2

$$\text{Error} = \frac{1.2}{693.2} \times 100 = 0.2\%$$

Step 1

The retained weights are expressed as percentages of the total weight:

$$\text{1/8" Sieve \% Retained} = \frac{37.0}{693.0} \times 100 = 5.3\%$$

$$\text{\#20 Sieve \% Retained} = \frac{294.1}{693.0} \times 100 = 42.4\%$$

$$\text{\#40 Sieve \% Retained} = \frac{169.2}{693.0} \times 100 = 24.4\%$$

$$\text{\#80 Sieve \% Retained} = \frac{123.9}{693.0} \times 100 = 17.9\%$$

$$\text{\#200 Sieve \% Retained} = \frac{56.8}{693.0} \times 100 = 8.2\%$$

$$\text{PAN \% Retained} = \frac{12.0}{693.0} \times 100 = 1.7\%$$

Step 2

The gradation of the fine aggregate in terms of percent passing each sieve are obtained by adding cumulatively, beginning with the smallest sieve.

#200 Sieve % Passing = 1.7%
#80 Sieve % Passing = 1.7 + 8.2 = 9.9%
#40 Sieve % Passing = 9.9 + 17.9 = 27.8%
#20 Sieve % Passing = 27.8 + 24.4 = 52.2%
1/8" Sieve % Passing = 52.2 + 42.4 = 94.6%
1/4" Sieve % Passing = 94.6 + 5.3 = 99.9%*

*The total cumulative percent passing may sometimes be within one or two tenths of 100.0% due to calculation rounding. This is acceptable.

G. REPORT

The fine aggregate gradation test results shall be determined and reported on form BR-159. It should be noted that the aggregate job mix tolerances are expressed to the nearest whole percent. Therefore, in determing whether or not a gradation is acceptable, the combined results are to be rounded off to the nearest whole percent.

H. ACTION

Action to be taken by the Plant Inspector regarding test results are as outlined in Section 2-3.

APPENDIX C

HOT BIN ANALYSIS

A. SCOPE

This test method prescribes the procedures for determining the individual hot bin gradation of coarse and fine aggregates and computing the combined gradation using the design batch weights.

B. GENERAL

The hot bin analysis shall be determined after the beginning of production for each mix type and then as listed in Section 2 of this manual.

C. SAMPLE

The samples shall be obtained from individual hot bins using the approved sampling device and reduced to testing size in accordance with Appendix A - Sampling of Aggregates. The amount of aggregate required for a representative sample and the size of sampling for testing are as follows:

Aggregate Size	Original Sample Lbs., Min.	Test Sample Lbs., Min.
#3	20	20
#2	20	20
#1	10	10
#1A	10	10
#1B	5	1½
Sand (Fines)	5	1½

D. EQUIPMENT

The following equipment is required for the hot bin analysis gradation test:

1. Independently power driven coarse aggregate and fine aggregate sieve shakers with appropriate sieves and timers
2. Large capacity scale
3. Pans and Brush

E. TEST PROCEDURE

Coarse Aggregate: All aggregate material passing sieves 2" thru and including 1/4".

1. Weigh the test sample to the nearest 0.01 pounds.

2. Sieve the test sample using the sieve sizes for the particular mix type for at least five (5) minutes. Do not overload the sieves. As a guide, any sieve loaded with more than a single layer of aggregate at the end of the test is considered overloaded. When overloading occurs, sieve only portions of the sample at a time, and combine like sizes after sieving.

3. Weigh the material retained on each sieve and pan to the nearest 0.01 pounds and record the retained weights. The total of the retained weights should agree within 0.3% with the original sample weight determined in Step 1.

NOTE: For mix gradations specifying sieves smaller than 1/8", the material left in the pan under the coarse aggregate sieves shall be sieved into the specified fine aggregate sizes using the fine aggregate sieve shaker. If several test results indicate that a negligible amount of -1/8" material remains from the coarse aggregate, the Regional Materials Engineer may delete this part of the test.

Fine Aggregate: All aggregate material passing sieves 1/4" thru and including #200.

1. Weigh the test sample to the nearest 0.1 gram.

2. Sieve the test sample using a nest of 8" diameter sieves for the particular mix type for at least ten (10) minutes. Do not overload the sieves. As a guide, when the #80 and/or #200 sieves are loaded in excess of 200 grams and/or any of the remaining sieves retain more than 300 grams of material at the end of the test, this is considered overloaded. When overloading occurs, sieve only portions of the sample at a time, and combine like sizes after sieving.

3. Weigh the material retained on each sieve and pan to the nearest 0.1 gram and record the retained weights. The total of the retained weights should agree within 0.3% of the original sample weight determined in Step 1.

F. CALCULATIONS

The calculations needed to determine the hot bin gradation are described by the example given below.

Example: A batch plant is producing Type 3 Binder using the following bins and draw weights. Refer to Figure C-1.

Bin No.	Draw Wts. Lbs.
2	1425
1	1425
1A	570
Sand	2109
Mineral Filler	171
TOTAL AGGREGATE	5700
Asphalt	300
TOTAL BATCH	6000

A test sample from Bin #1 has been sieved and the weights of retained material are as follows:

Sieve	Weight Retained (Lbs.)
1"	0
1/2"	0.24
1/4"	12.76
1/8"	1.32
PAN	0.00
TOTAL	14.32

Step 1

The retained weights are expressed as percentages of the total weight:

$$1/2\text{" Sieve \% Retained} = \frac{0.24}{14.32} \times 100 = 1.7\%$$

$$1/4\text{" Sieve \% Retained} = \frac{12.76}{14.32} \times 100 = 89.1\%$$

$$1/8\text{" Sieve \% Retained} = \frac{1.32}{14.32} \times 100 = 9.2\%$$

Step 2

The gradation of the aggregate obtained from Bin 1 in terms of percent passing each sieve are obtained by adding cumulatively, beginning with the smallest sieve.

1/8" Sieve % Passing = 0%
1/4" Sieve % Passing = 0 + 9.2 = 9.2%
1/2" Sieve % Passing = 9.2 + 89.1 = 98.3%
1" Sieve % Passing = 98.3 + 1.7 = 100.0%*

*The total cumulative percent passing may sometimes be within one or two tenths of 100.0% due to calculation rounding. This is acceptable.

NOTE: The aggregate material from the remaining bins are calculated using the same procedure as outlined in Steps 1 and 2.

When mineral filler is added separately to any mix, it shall be considered as 100% passing all sieve sizes down to and including the #80. Thirty percent shall be considered retained on the #200 sieve and 70% passing the #200, unless documentation exists showing the gradation of the mineral filler to be different, then the documented gradation results will be used.

Step 3

The percent batched for each bin is expressed as percentages of the <u>total aggregate</u> batched.

$$\text{Bin \#2 \% Batched} = \frac{1425}{5700} \times 100 = 25.0\%$$

$$\text{Bin \#1 \% Batched} = \frac{1425}{5700} \times 100 = 25.0\%$$

$$\text{Bin \#1A \% Batched} = \frac{570}{5700} \times 100 = 10.0\%$$

$$\text{Bin (Fine) \% Batched} = \frac{2109}{5700} \times 100 = 37.0\%$$

$$\text{Bin (Min. Filler) \% Batched} = \frac{171}{5700} \times 100 = 3.0\%$$

TOTAL AGGREGATE PERCENT BATCHED 100.0%

Step 4

The percent passing for each bin are expressed as percentages of the percent batched for that bin.

Bin #2

1" Sieve % Passing = $\frac{25.0 \times 100}{100}$ = 25.0%

1/2" Sieve % Passing = $\frac{25.0 \times 18.3}{100}$ = 4.6%

Bin #1

1" Sieve % Passing = $\frac{25.0 \times 100}{100}$ = 25.0%

1/2" Sieve % Passing = $\frac{25.0 \times 98.3}{100}$ = 24.6%

1/4" Sieve % Passing = $\frac{25.0 \times 9.2}{100}$ = 2.3%

Bin #1A

1" Sieve % Passing = $\frac{10.0 \times 100}{100}$ = 10.0%

1/2" Sieve % Passing = $\frac{10.0 \times 100}{100}$ = 10.0%

1/4" Sieve % Passing = $\frac{10.0 \times 86.0}{100}$ = 8.6%

1/8" Sieve % Passing = $\frac{10.0 \times 2.2}{100}$ = 0.2%

Bin (Fines)

1" Sieve % Passing = $\frac{37.0 \times 100}{100}$ = 37.0%

1/2" Sieve % Passing = $\frac{37.0 \times 100}{100}$ = 37.0%

1/4" Sieve % Passing = $\frac{37.0 \times 100}{100}$ = 37.0%

1/8" Sieve % Passing = $\frac{37.0 \times 94.8}{100}$ = 35.1%

#20 Sieve % Passing = $\frac{37.0 \times 74.5}{100}$ = 27.6%

#40 Sieve % Passing = $\frac{37.0 \times 37.7}{100}$ = 13.9%

#80 Sieve % Passing = $\frac{37.0 \times 6.0}{100}$ = 2.2%

#200 Sieve % Passing = $\frac{37.0 \times 2.7}{100}$ = 1.0%

Bin (Mineral Filler)

1" Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

1/2" Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

1/4" Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

1/8" Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

#20 Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

#40 Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

#80 Sieve % Passing = $\frac{3.0 \times 100}{100}$ = 3.0%

#200 Sieve % Passing = $\frac{3.0 \times 70}{100}$ = 2.1%

Step 5

The percents passing for each sieve are totaled to obtain the combined mix gradation and the results compared with the job mix formula limits. See Figure C-1 (Combined Gradation) page C-6.

Step 6

The actual weight of asphalt batched is expressed as a percentage of the Total Batch Weight and the results compared with the Job Mix Formula limits.

$$\% \text{ Asphalt} = \frac{300}{5700+300} \times 100 = 5.0\%$$

G. REPORT

The hot bin gradation and the percent asphalt batched test results shall be recorded on Form BR-161a, Hot Bin Analysis. It should be noted that the aggregate job mix tolerances are expressed to the nearest whole percent.

Therefore, in determining whether or not a gradation is acceptable, the combined results are to be rounded off to the nearest whole percent. For example, the combined gradation of 1/2" sieve (79.2) is reported as 79%.

H. ACTION

Actions to be taken by the Plant Inspector regarding test results are as outlined in Section 2-2.

BR 161a (5/68)

STATE OF NEW YORK – DEPARTMENT OF TRANSPORTATION – MATERIALS BUREAU

HOT BIN ANALYSIS

PLANT XYZ Blacktop Co. Parkville, N.Y. INSPECTOR Joseph Bushey DATE 9/14/86

ITEM NO. 403.13 MIX TYPE 3- Binder AGGREGATE TEMP. 280 °F BITUMEN TEMP. 310 °F

FIGURE C-1

BIN BREAKDOWN

Sieve Sizes	No. 2			No. 1			No. 1A			No. 1B			FINES			MINERAL FILLER		
	Wt.#	% ret.	% pass	Wt.#	% ret.	% pass	Wt.#	% ret.	% pass	Wt.	% ret.	% pass	Gms. Wt.	% ret.	% pass	Wt.	% ret.	% pass
2"																		
1½"																		
1"	0	0	100.0	0	0	100.0	0	0	100.0				0	0	100.0			100.0
½"	27.84	81.7*	18.3	0.24	1.7	98.3	0	0	100.0				0	0	100.0			100.0
¼"	6.24	18.3	0.0	12.76	89.1*	9.2	2.12	14.0	86.0				0	0	100.0			100.0
1/8"				1.32	9.2	0.0	12.70	83.8*	2.2				34	5.2	94.8			100.0
20													133	20.3*	74.5			100.0
40													242	36.8	37.7			100.0
80													208	31.7	6.0			100.0
200													22	3.3	2.7			70.0
PAN	0.00			0.00			0.33	2.2	0.0				18	2.7	0.0			0.0
Totals	34.08	100.0		14.32	100.0		15.15	100.0					657	100.0				

COMBINED GRADATION

BIN	lbs batched	% batched	% Passing Sieve									
			2"	1-1/2"	1"	1/2"	1/4"	1/8	20	40	80	200
2	1425	25.0			25.0	4.6						
1	1425	25.0			25.0	24.6	2.3					
1A	570	10.0			10.0	10.0	8.6	0.2				
1B												
FINES	2109	37.0			37.0	37.0	37.0	35.1	27.6	13.9	2.2	1.0
Min. Filler	171	3.0			3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.1
TOTAL	5700				100.0	79.2	50.9	38.3	30.6	16.9	5.2	3.1
JOB MIX LIMITS					95/100	74/88	48/62	32/46	23/37	10/24	4/12	2/6

*Denotes % Primary Size.

Lbs. Bitumen Batched 300

% BITUMEN 5.0

JOB MIX LIMITS 4.6-5.4

APPENDIX D

COMPOSITE AGGREGATE GRADATION ANALYSIS

A. SCOPE

This test method prescribes the procedures for determining the gradation of the composite aggregate used in bituminous concrete when produced by a drum mix plant.

B. GENERAL

Composite aggregate gradations shall be determined prior to production and after proportions for the individual aggregate feeds have been established for any mix type. Thereafter, a composite aggregate gradation shall be performed at the frequency outlined in Section 2 of this Method.

C. SAMPLE

The composite aggregate sample shall be obtained using the approved automatic sampling device and reduced to testing size in accordance with Appendix A - Sampling of Aggregates. The amount of composite aggregate required for testing shall be as follows:

Mix Types	Test Sample Lbs., Min.
Open Base	30
Dense Base	25
Dense Binder	20
Top and Shim	15

D. EQUIPMENT

The following equipment is required for the composite aggregate gradation test:

1. Independently power driven coarse aggregate sieve shaker with appropriate sieves and timer
2. Large capacity scale
3. Oven or hot plate
4. Pans, brush, and stirring spoon

E. TEST PROCEDURE

1. Dry the sample to a constant weight. (NOTE: Open base may be sieved without drying when determined by the Regional Materials Engineer.)

2. Weigh the sample to the nearest 0.01 pounds.

3. Sieve the sample using the sieve sizes for the particular mix type for at least ten (10) minutes. Do not overload the sieves. As a guide, any sieve loaded with more than a single layer of aggregate at the end of the test is overloaded. When overloading occurs, sieve only portions of the sample at a time, and combine like sizes after sieving.

4. Weigh the material retained on each sieve and pan to the nearest 0.01 pounds and record the retained weights. The total of the retained weights should agree closely with the original sample weight determined in Step 2. When sieving dense graded mixes it is possible that some material from the #80 and #200 sieve could be lost due to handling. Therefore, if the results on the #80 and #200 sieves are within 1.0% of the lower Job Mix Formula Limit, the results will be considered within the Job Mix Formula Limit.

F. CALCULATIONS

The calculations needed to determine the composite aggregate gradation are described by the example given below.

Example: A composite aggregate sample from a dense mix has been sieved and weights of the retained material are as follows:

Sieve Size	Weight Retained
1"	0 lbs
1/2"	4.47 lbs.
1/4"	6.08 lbs.
1/8"	2.71 lbs.
#20	1.66 lbs.
#40	2.94 lbs.
#80	2.52 lbs.
#200	0.39 lbs.
PAN	0.73 lbs.
TOTAL	21.50 lbs.

NOTE: When mineral filler is added separately to any mix, it shall be considered as 100% passing all sieves sizes down to and including the #80. Thirty percent (30%) shall be considered retained on the #200 sieve and 70% passing the #200. It shall be added to the composite aggregate gradation for any mixes requiring it in the proportion that it is added to the mix. If documented results exists showing the mineral filler gradation to be different the actual gradation results should be used.

Step 1

The retained weights are expressed as percentages of the total weigh:

$$\text{1/2" Sieve \% Retained} = \frac{4.47}{21.50} \times 100 = 20.8\%$$

$$\text{1/4" Sieve \% Retained} = \frac{6.08}{21.50} \times 100 = 28.3\%$$

$$\text{1/8" Sieve \% Retained} = \frac{2.71}{21.50} \times 100 = 12.6\%$$

$$\text{\#20 Sieve \% Retained} = \frac{1.66}{21.50} \times 100 = 7.7\%$$

#40 Sieve % Retained = $\frac{2.94}{21.50}$ X 100 = 13.7%

#80 Sieve % Retained = $\frac{2.52}{21.50}$ X 100 = 11.7%

#200 Sieve % Retained = $\frac{0.39}{21.50}$ X 100 = 1.8%

PAN % Retained = $\frac{0.73}{21.50}$ X 100 = 3.4%

Step 2

The gradation of the composite aggregate in terms of percent passing each sieve are obtained by adding cumulatively, beginning with the smallest sieve.

#200 Sieve % Passing = 3.4%
#80 Sieve % Passing = 3.4 + 1.8 = 5.2%
#40 Sieve % Passing = 5.2 + 11.7 = 16.9%
#20 Sieve % Passing = 16.9 + 13.7 = 30.6%
1/8" Sieve % Passing = 30.6 + 7.7 = 38.3%
1/4" Sieve % Passing = 38.7 + 12.6 = 50.9%
1/2" Sieve % Passing = 50.9 + 28.3 = 79.2%
1" Sieve % Passing = 79.2 + 20.8 = 100.0%*

*The total cumulative percent passing may sometimes be only within one or two tenths of 100.0% due to calculation rounding. This is acceptable.

G. REPORT

The composite aggregate gradation test results shall be recorded on Form BR-159, (Figure D-1, D-2) Production Tests Bituminous Concrete Drum Mix Plant. It should be noted that the aggregate job mix tolerances are expressed to the nearest whole percent. Therefore, in determing whether or not a gradation is acceptable, the combined results are to be rounded off to the nearest whole percent. For example, the percent passing the 1/4" sieve (50.9) would be rounded to 51%.

H. ACTION

Actions to be taken by the Plant Inspector are as outlined in Section 2-3.

BR 159 (6-85)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

PRODUCTION TESTS
BITUMINOUS CONCRETE DRUM MIX PLANT

PLANT XYZ Blacktop Co. LOCATION Berkville, N.Y REGION 7

DATE 8/13/86 MIX TYPE 3 - Binder JMF NO. 3 RAP % —

INSPECTOR Joseph Bushey % MINERAL FILLER ADDED 0.0

CHECK TEST(S) REPORTED ON THIS FORM
- ☒ COMPOSITE GRADATION
- ☐ EXTRACTION GRADATION
- ☐ STOCKPILE GRADATION
- ☐ COMPOSITE MOISTURE
- ☐ MIX/RAP MOISTURE
- ☐ BITUMEN CONTENT

MOISTURE CONTENT				
	Composite	Composite	Mix	Rap
Wt. Wet(A)				
Wt. Dry(B)				
Wt. H_2O(A – B)				
% Moisture $\frac{A-B}{B} \times 100$				

BITUMEN CONTENT		
Wt. Sample(A)		
Wt. Agg.(B)		
Wt. Gain Filt.(C)		
Wt. Bit.(A – [B + C])		
% Bitumen $\frac{A-[B+C]}{A} \times 100$		
Corrected % Bit. (% Bit. - Mix Mois.)		
JMF RANGE		

	(Composite) GRADATION			( ) GRADATION			( ) GRADATION			
SIEVE	WEIGHT	% RET.	% PASS.	WEIGHT	% RET.	% PASS.	WEIGHT	% RET.	% PASS.	JMF RANGE
2"										
1 1/2"										
1"	0	0.0	100.0							
1/2"	4.47	20.8	79.2							
1/4"	6.08	28.3	50.9							
1/8"	2.71	12.6	38.3							
#20	1.66	7.7	30.6							
#40	2.94	13.7	16.9							
#80	2.52	11.7	5.2							
#200	0.39	1.8	3.4							
#PAN	0.73	3.4	—							
TOTAL	21.50	100.0								

FIGURE D-1

SR 159 (6/85)
REVERSE

STOCKPILE GRADATION TYPE SAND

SIEVE	WEIGHT	% RET.	% PASS.	RANGE
2"				
1 1/2"				
1"				
1/2"				
1/4"	—	—	100	
1/8"	64.7	6.3	93.7	
#20	424.7	41.0	52.7	
#40	266.7	25.8	26.9	
#80	217.4	21.0	5.9	
#200	44.2	4.3	1.6	
#PAN	16.1	1.6		
TOTAL	1033.8	100		

STOCKPILE GRADATION TYPE #2 Stone

SIEVE	WEIGHT	% RET.	% PASS.	RANGE
2"				
1 1/2"	—	—	100	90-100
1"	0.40	1.8	98.2	90-100
1/2"	20.45	92.7	5.5	5-15
1/4"				
1/8"				
#20				
#40				
#80				
#200				
#PAN	1.25	5.5		
TOTAL	22.60	100		

STOCKPILE GRADATION TYPE #1A Stone

SIEVE	WEIGHT	% RET.	% PASS.	RANGE
2"				
1 1/2"				
1"				
1/2"	—	—	100	90-100
1/4"	1.86	8.2	91.8	85-95
1/8"	18.79	83.1	8.7	5-15
#20				
#40				
#80				
#200				
#PAN	1.95	8.7		
TOTAL	22.60	100		

STOCKPILE GRADATION TYPE #3 Stone

SIEVE	WEIGHT	% RET.	% PASS.	RANGE
2"	1.08	2.9	97.1	90-100
1 1/2"	10.76	28.9	68.2	65-75
1"	21.12	56.7	11.5	10-20
1/2"				
1/4"				
1/8"				
#20				
#40				
#80				
#200				
#PAN	4.26	11.5		
TOTAL	37.22	100		

STOCKPILE GRADATION TYPE #1 Stone

SIEVE	WEIGHT	% RET.	% PASS.	RANGE
2"				
1 1/2"				
1"	—	—	100	90-100
1/2"	0.10	0.4	99.6	90-100
1/4"	21.39	85.8	13.8	10-20
1/8"				
#20				
#40				
#80				
#200				
#PAN	3.44	13.8		
TOTAL	24.93	100		

STOCKPILE GRADATION TYPE _____

SIEVE	WEIGHT	% RET.	% PASS.	RANGE
2"				
1 1/2"				
1"				
1/2"				
1/4"				
1/8"				
#20				
#40				
#80				
#200				
#PAN				
TOTAL				

FIGURE D-2

APPENDIX E-1

COMPOSITE AGGREGATE MOISTURE TEST

A. SCOPE

This test method prescribes the procedures for determining the moisture content of the composite aggregate used in bituminous concrete when produced by a drum mix plant.

B. GENERAL

Composite aggregate moisture content shall be determined prior to production for each mix type, and at the frequencies listed in Section 2.

C. SAMPLE

The composite aggregate moisture sample shall be obtained using the automatic sampling device and reduced to testing size in accordance with Appendix A - Sampling of Aggregates. The amount of composite aggregate required for testing shall be as follows:

Mix Types	Test Sample Lbs., Min.
Open Base	15
Dense Base	15
Dense Binder	10
Top and Shim	5

D. EQUIPMENT

The following equipment is required for the composite aggregate moisture content test:

1. Oven or hot plate
2. Large capacity scale
3. Pans, brush and stirring spoon

E. TEST PROCEDURES

1. Weigh the sample to the nearest 0.01 pounds.
2. Dry the sample to a constant weight.
3. Cool the sample and reweigh.

F. CALCULATIONS

The moisture content of the composite aggregate is computed by using the following formula:

$$\% \text{ Moisture} = \frac{W \text{ wet} - W \text{ dry}}{W \text{ dry}} \times 100\%$$

WHERE: W wet = Weight of sample containing moisture
W dry = Weight of sample dried to a constant weight

G. REPORT

The composite aggregate moisture content test results shall be recorded on Form BR-159, Production Tests Bituminous Concrete Drum Mix Plant. Round off the moisture content to the nearest tenth of a percent.

H. ACTION

Actions to be taken by the Plant Inspector are as outlined in Section 2-3.

APPENDIX E-2

RECYCLE ASPHALT PAVEMENT (RAP) MOISTURE TEST

A. SCOPE

The RAP prior to its introduction into the mixing plant contains moisture. The determination of this moisture content is necessary so that the batching weights can be adjusted. This adjustment is necessary to determine the increase in weight programmed for the RAP component to compensate for the moisture loss when the material is heated.

B. GENERAL

Since the determination of moisture content is a lengthy test, the Plant Inspector may use the RAP moisture test results obtained on the previous day to start production. These results can only be used if there was no major change in conditions such as a rainstorm. The minimum testing frequency is one RAP moisture test per day.

C. SAMPLE

The sample shall be obtained and reduced to testing size in accordance with Appendix A - Sampling of Aggregates. The minimum sample size for RAP moisture testing is 2500 grams.

D. EQUIPMENT

The following equipment is required for the composite aggregate moisture content test:

1. Oven or hot plate
2. Large capacity scale
3. Pans, brush and stirring spoon

E. TEST PROCEDURES

1. Weigh the sample to the nearest 0.01 pounds.
2. Dry the sample to a constant weight.
3. Cool the sample and reweigh.

F. CALCULATIONS

The moisture content of the composite aggregate is computed by using the following formula:

$$\% \text{ Moisture} = \frac{W \text{ wet} - W \text{ dry}}{W \text{ dry}} \times 100\%$$

WHERE: W wet = Weight of sample containing moisture
W dry = Weight of sample dried to a constant weight

NOTE: As the sample is normally dried on a hot plate, the sample shall be stirred while drying so that no overheating or burning of the asphalt occurs during testing.

G. REPORT

The RAP moisture content test results shall be reported to the nearest tenth of a percent.

H. ACTION

Actions to be taken by the Plant Inspector are as outlined in Section 2-3.

APPENDIX F

HIGH FRICTION AGGREGATE DETERMINATION

A. SCOPE

This method describes specific procedures for sampling high friction coarse aggregates in bituminous concrete surface course mixes.

B. GENERAL

The Producer uses one of two methods for producing bituminous concrete in compliance with the specifications for high friction surface course mixes. The mixes are manufactured at the mixing plant using either:

1. All coarse aggregates from approved high friction sources.

2. Non-carbonate coarse aggregate particles blended with low friction carbonate aggregates at the bituminous concrete mixing plant.

In addition to aggregate gradation and asphalt cement contents, the Producer identifies the aggregate source numbers when submitting job mix formulas. All coarse aggregates specified on the job mix formula are from sources that are approved by the Department as high friction aggregates except those aggregates which are upgraded by adding non-carbonate particles at the mixing plant.

C. AGGREGATE SAMPLING

Frequency of sampling shall be as listed on the appropriate top course Job Mix Formula.

D. PROCEDURE

Samples shall be taken by the Plant Inspector from the materials used for gradation tests, and shall be submitted to the Materials Bureau for high friction properties determination. These samples are obtained as follows:

Batch Plant - Aggregate gradation test from hot bin analyses.
Drum Mix Plant - Aggregate gradation test from composite gradation.

The sizes and quantities of aggregates to be submitted as high friction samples are as follows:

	Primary Size (Passing-Retained)	Quantity (Packaged Individually)
Coarse Aggregate	#1 (1/2"-1/4")	1 Quart
	#1A (1/4"-1/8")	1 Quart

Example: Coarse Aggregate High Friction Sample - If a sample of #1 sized aggregate is to be submitted, the Plant Inspector should take material that has been sieved as part of his gradation analysis. Material that has passed the 1/2" sieve and has been retained on the 1/4" sieve is taken in sufficient quantity to fill a one quart can. This is primary sized #1's and includes no oversized particles (over 1/2") or undersized particles (under 1/4").

E. SAMPLE SUBMITTAL

Form BR-3a, entitled "Aggregate Sample and Acceptance Transmittal," shall accompany all samples submitted to the Materials Bureau. An example of a completed BR-3a is shown in Figure F-1.

The BR-3a is a four part, color coded, snap out form. It has provisions for entering sample identification by the Plant Inspector and, acceptance or rejection action along with any necessary test data by the Materials Bureau. The white copy of the form is then returned to the originating Region by the Materials Bureau upon completion of the tests.

BR-3a (1/76)
(NYS DOT)

AGGREGATE SAMPLE AND ACCEPTANCE TRANSMITTAL

Serial Number: 51590 | Date Received: | Test Number:

TO:

Material Represented by the Sample Described Below Was

ON _____ For _____

(Action Official Only When Validated Below By The Materials Bureau)

TEST DATA	
Specific Gravity	
Absorption	
Fineness Modulus	

UPPER PORTION FOR MATERIALS BUREAU ONLY – INSPECTOR TO COMPLETE ALL APPLICABLE BOXES BELOW

1. Material (Type & Size): CRUSHED STONE #1 #1A
2. Item: 403.1701
3. Date Sampled: 9/15/86
4. Source No.: ~~2-43R~~ 2-6F
5. Type of Sample: ☐ Petrographic ☐ Biennial ☐ Information ☒ Hot Bin ☐ Other
6. Aggregate Producer: SPECIALITY CR.ST.
7. Address: TOWNE, NY
8. Town:
9. County:
10. USGS Coordinates:
11. Latitude/Longitude:
12. Sampled From: Hot Bin
13. Additional Information: JMF # 1
% Batched # 1A - 36.0% } 2 Cons
# 1 - 24.0% }
14. Sampling Location: 10232 Allied Blacktop #3 Limerock NY
15. Time Sampled: 1:00 pm
16. Quantity: 300T
17. Current Acceptance No.:
18. Sampled by (include Region or Agency): Bill Ostrano (R-12)

RETAIN GOLD COPY FOR YOUR RECORDS
FORWARD ALL OTHERS TO MATERIALS BUREAU

Materials Bureau Validation

FIGURE F-1

APPENDIX G

DETERMINATION OF COARSE AGGREGATE CRUSH COUNT

A. SCOPE

Coarse aggregates used in asphalt concrete must conform to the requirements of the Standard Specifications Section 703-02 - Coarse Aggregate Material Requirements.

This method prescribes the procedure for performing a crush count test on coarse aggregate used in bituminous concrete mixes. Crush count is determined for each primary size aggregate as appropriate for the mix type being produced.

B. GENERAL

The crush count shall be performed on coarse aggregate at a test frequency determined by the Regional Materials Engineer. Test results must meet the following requirements:

Minimum % by Weight in any Primary Size

No. 2 size and larger (1 fractured face) - 75
Smaller than No. 2 (2 fractured faces) - 85

The No. 2 and larger primary size materials shall have at least one fractured face to be considered crushed. The smaller than No. 2 sizes shall have at least two fractured faces. A crushed particle is one in which the total area of face fracture exceeds 25% of the maximum cross-sectional area of the particle. Where two fractured faces are designated the total area of each fractured face shall exceed 25% of the maximum cross-sectional area of the particle.

C. SAMPLING

The samples for crush count testing shall be obtained as follows:

In batch plants, hot bin aggregate samples shall be used, In drum mix plants, composite aggregate samples shall be used. The test shall be run on all aggregates retained on the 1/8", 1/4", and 1/2" sieve sizes.

D. PROCEDURE

All +1" material shall be scalped and discarded prior to running this test. Split the sample to obtain sample sizes as follows:

-For Primary Size 2 (Passing 1" Retained on 1/2") - Approximately 2500 grams
-For Primary Size 1 (Passing 1/2" Retained on 1/4") - Approximately 300 grams
-For Primary Size 1A (Passing 1/4" Retained on 1/8") - Approximately 50 grams

Sieve the sample as for gradation testing. Weigh the particles retained on each sieve (1/2", 1/4", 1/8"). Separate each sieve fraction into two piles by placing uncrushed particles in one pile and crushed particles as defined above in the other pile.

Weigh the crushed particles of each sieve fraction and divide this weight by the total sample weight for the sieve fraction. This is the crush count. The percentages by weight of crushed particles shall be as specified under Part B, above.

Example:

Wt. Retained on 1/4" sieve = 316 gms.
Wt. Crushed Particles = 296 gms.

$$\frac{\text{Wt. Crushed}}{\text{Wt. Total}} = \frac{296}{316} = 93.7\%*$$

*This is crush count for primary size #1 (Passing 1/2" retained on 1/4").

E. ACTION

If the results of the crush count do not meet the requirements as specified here and in Section 401 of the Standard Specifications the Plant Inspector shall notify the Producer and contact the Regional Materials Engineer.

APPENDIX H

MIXTURE MOISTURE TEST

A. SCOPE

This method describes specific procedures for performing moisture tests on mixes produced in a drum mix plant, and on any recycled mix.

B. GENERAL

Samples for mixture moisture testing shall be obtained from the haul unit. The moisture content shall be determined by drying the sample to constant weight. The weight loss is calculated as the percentage of moisture.

C. MIX MOISTURE TESTING

Moisture content testing on the mix is performed to verify that the material has been properly heated and dried. The mix moisture shall not exceed the specification limits once discharged into the haul unit.

D. PROCEDURE

The minimum testing frequency is one mix moisture test per day.

The minimum sample sizes to determine mix moisture content are as follows:

Mix Type	Minimum Sample Size, Grams
Open Base, Dense Base	2500
Dense Binder	2000
Top Courses, Shim	1500

The moisture content of the mix shall be determined by the following equation:

$$\% \text{ Moisture} = \frac{W \text{ Wet} - W \text{ Dry}}{W \text{ Dry}} \times 100\%$$

WHERE: W Wet = Weight of sample as taken from the mix discharged into the haul unit.

W Dry = Weight of sample dried in a 350°F oven for four hours.

E. The mix moisture content test results shall be reported to the nearest tenth of a percent.

F. ACTION

Actions to be taken by the Plant Inspector are as outlined in Section 2-2 and Section 401 of the Standard Specifications.

APPENDIX I

BITUMINOUS EXTRACTION TEST

A. SCOPE

This method describes specific sampling and testing procedures required for field determination of asphalt content and aggregate gradation of the Reclaimed Asphalt Pavement (RAP) and/or bituminous mixtures.

B. GENERAL

Bituminous mix samples shall be taken from the haul unit. The top foot of material shall first be removed. A scoop shall be forced vertically downward into the material and the sample removed so as to keep all material in the scoop as it is lifted out.

The minimum size sample on which the test is run depends on the mix type being produced and as follows:

Mix Type	Minimum Sample Size, Grams
Dense Base	2500
Dense Binder	2000
Top Courses, Shim	1000
RAP Material	2500

A RAP sample shall be representative of the material being used and shall be obtained from the stockpile in accordance with Appendix A. The sample shall be dried to constant weight before testing (overnight in a 230°F oven).

C. EQUIPMENT

The minimum equipment necessary for performing the extraction test is as follows:

1. Extraction apparatus of at least 1000 grams capacity for virgin mixes (in batch plants) or 3000 grams minimum (in drum mix plants), or 3000 grams capacity for recycle mixes in any plant. If the extractor is a centrifuge, it shall be capable of being revolved at controlled speeds up to 3600 rpm and it shall have explosion-proof features, a shell for catching the solvent, and a drain for removing the solvent. Installation shall be under an exhaust hood which is ducted to the atmosphere.

2. Hot plate and pan for drying aggregate.

3. Balance of at least the same capacity as the extractor, accurate to 0.5 grams.

4. Filter rings to fit the bowl of the centrifuge extractor, or filter paper for the reflux extractor.

5. Metal spatula - 6" blade.

6. #8 stencil brush, medium stiff bristles.

7. Solvent for asphalt; Sovasol #5 or other solvents proven by past experience may be used.

D. PROCEDURE

Determination of Asphalt Content (Centrifuge Extractor)

Carefully weigh a quantity of material slightly less than the capacity of the extractor. "Dribbling" material to exactly meet a predetermined weight such as 2000 grams is poor testing practice and shall be avoided.

Next, add sufficient solvent to the mixture until all aggregates are covered while gently separating the particles with the spatula until the solvent has worked into all voids.

Place the bowl, containing the mixture and solvent, in the extractor and place a filter ring (after first drying the filter paper and determining its weight) on the edge of the bowl; then place the cover on the filter ring and draw down snugly by means of the combination milled nut and funnel arrangement.

Start the bowl rotating slowly at first in order to permit the aggregate to be distributed uniformly around the inside of the bowl. Gradually increase the speed, by means of the regulator, until the dissolved asphalt flows from the spout in a thin stream, continuing until the first charge has drained. Shut off the motor and allow the bowl to stop, then add a fresh portion of solvent thru the funnel-milled nut arrangement. This operation is repeated until the sample has been washed a minimum of three times. The extracted liquid, when observed in a separate container, should be clear or at least not darker than a light straw color. With a little experience, the operator can soon gauge exactly what treatment is necessary for any given material.

When the last addition of solvent has drained off, remove the bowl, with cover plate intact, and place on a sheet of manila paper. Carefully remove the cover plate and filter ring and brush all fine material adhering to each into a pan. Then dry and weigh the filter paper. The increase in weight is considered as material passing #200 sieve. Carefully loosen the damp sample in the bowl with a small metal spatula and then brush into the pan, making sure that all material is removed from the bowl, spatula and brush. If any of the material falls on the sheet of manila paper, this should also be brushed into the pan, and the pan heated on a hot plate until dry.

When the sample is dry, cool it to room temperature, then carefully brush into a balance pan and weigh. The difference between this weight (adding the increase in dried filter weight) and the original weight of the sample placed in the bowl is the weight of asphalt extracted.

Determination of Asphalt Content (Reflux Extractor)

Line the extractor cones with dried and weighed filter paper folded to form a 3-cone with a single 1-ply seam and carefully weigh a quantity of material slightly less than the extractor capacity.

"Dribbling" material to exactly meet a predetermined weight such as 2000 grams is poor testing practice and shall be avoided.

Assemble the cones in the frame and place in the extractor jar. Carefully pour about 2000 ml. of the solvent over the sample in the top cone. At no time shall the level of solvent in the extractor jar contact the tip of the lower cone.

Place the apparatus on an electric hot plate, circulate cold water through the condenser and adjust the hot plate so that a steady flow of solvent drips into the top cone. At no time should the level of solvent overflow the filter cones but should be sufficient to cover the samples.

When the solvent running from the lower filter is colorless, as viewed against a white background, shut off the heat but allow the condenser to operate until the frames cool sufficiently so they can be handled.

Finally, remove the filter cones, including the sample, and dry to a constant weight. The difference between this weight and the original sample and cone weight will be the weight of asphalt extracted. Subtract the original weight of filter paper to determine aggregate weight.

Gradation Determination

Equipment required for this test includes a mechanical sieve shaker and a nest of 8" diameter sieves of the required sizes to determine the gradation of the sample.

The aggregate sample used shall consist of the entire quantity of aggregates from which the bituminous material has been extracted. This weight was the final dry weight of the aggregate extracted and was previously recorded.

Place the aggregate sample in the nest of sieves containing the various sizes required by the mix type, covering the mixture with a pan under the #200 sieve and a cover above the top sieve. Then place the sieves in the mechanical shaker and sieve for approximately 10-15 minutes. At the end of this period, remove the sieves from the shaker and record the weight of material retained on each sieve, including the amount passing the #200 and retained on the pan. The sum of these various weights should check with the dried weight of the aggregate after extraction within ±0.3%.

Care must be taken so as not to overload the 8" diameter fine aggregate sieves. As a guide, when the #80 and/or the #200 sieves are loaded in excess of 200 grams and/or any of the other sieves retain more than approximately 300 grams of material at the end of the test, the sieves shall be considered overloaded. When overloading occurs, it will be necessary to sieve only portions of the sample at a time, adding the results to obtain the total gradation. Scalping sieves may be introduced into the nest of sieves above the critical sizes as another method to prevent an overload condition.

In weighing the material retained on the sieves, the loose material is dumped on the balance pan, then the sieve is placed upside down on manila paper and the bottom of the sieve brushed with a medium stiff bristle brush such as a #8 stencil brush. After brushing the sides of the sieves should be tapped sharply with the wooden handle of the brush; this will dislodge all the loosened particles so that they will fall to the paper. These particles shall be brushed into the balance pan and weighed with the remainder of the material retained.

Calculations

The asphalt content of the sample is equal to:

$$\% \text{ Asphalt} = \frac{Ws - Wa}{Ws} \times 100$$

WHERE: Ws = Weight of the sample before extraction.
Wa = Weight of the dried aggregate after extraction (including the increase of the filter dry weight).

The aggregate gradation calculations are illustrated by the following example: A sample of dense binder mix weighs 2051.0 grams. After extraction, the dried aggregate weighs 1939.0 grams. The aggregate weights retained on each sieve are recorded in the "Grams Retained" column shown on the completed BR-160 (page I-5).

Next, these weights are expressed as percentages of the total aggregate weight and recorded in the "% Retained" column.

$$\% \text{ Retained on \#200} = \frac{46}{1939} \times 100 = 2.4\%$$

$$\% \text{ Retained by PAN} = \frac{85^*}{1939} \times 100 = 4.4\%$$

*Includes 5 grams increase in filter weight.

The results in the "Cumulative % Passing" column are obtained by adding the figures recorded in the "% Retained" column from the smallest sieve upwards to the largest.

% Passing #200 = 4.4
% Passing #80 = 4.4 + 2.4 = 6.8
% Passing #40 = 6.8 + 4.9 = 11.7

Continue this procedure for all remaining sieves. Note that the top cumulative percent passing should always come within a few tenths of 100.0% as a check of the computations. The slight discrepancy of a few tenths can be attributed to the rounding of the figures.

However, it should be noted that the aggregate job mix tolerances are expressed to the nearest whole percent. Therefore, in determining whether or not a gradation is acceptable, the results are to be rounded to the nearest whole percent. Accordingly, if the percent passing the #200 sieve was 1.5, 1.6, etc., it would be rounded to 2%. If the percentage was 6.4, 6.3, etc., it would be rounded to 6%.

The asphalt content results are always expressed to the nearest 0.1%.

E. ACTION

Actions to be taken by the Plant Inspector are as outlined in Section 2-2.

BR 160 (5/71)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

MATERIALS BUREAU

BITUMINOUS CONCRETE PLANT EXTRACTION RESULTS

Region 12 Sample No. 5

Plant XYZ Blacktop Co Location Parkville, NY

This test represents 1/2 days production of Item No. 403.13 (Recycled)

Mix type Dense Binder Job Mix Formula No. 3

Type of sample; Plant X, Paving _____.

Date sampled 4-24-86 By J. Bushey

Weight of Sample 2051.0 grams

Weight of Aggregate 1939.0 grams % Bitumen Content 5.5

Weight of Bitumen 112.0 grams Job Mix Limits 5.0 - 5.8

SIEVE ANALYSIS				
Sieve	Grams Retained	% Retained	Cumulative % Passing	Job Mix Limits
2"				
1½"	0	0.0	100	100
1"	35	1.8	98.2	95-100
½"	351	18.1	80.1	74-86
¼"	248	12.8	67.3	58-72
1/8"	421	21.7	45.6	40-54
#20	551	28.4	17.2	15-29
#40	107	5.5	11.7	8-22
#80	95	4.9	6.8	4-12
#200	46	2.4	4.4	2-6
Pan	85	4.4		
Totals	1939	100.0		

Computed By J. Bushey

FIGURE I-1

APPENDIX J

BITUMINOUS MIXTURF MONITORING/SAMPLING

A. SCOPE

This method describes the responsibilities of the Plant Inspector and procedures used for the sampling and preparation of bituminous concrete top course plant mix samples for monitoring Marshall properties.

B. GENERAL

Routine bituminous concrete top course mix samples shall be collected and prepared for testing a minimum of one per day or for initial 500 tons production, and then every 1000 tons.

C. SAMPLING

The most important consideration in sampling is to be certain that the sample taken is representative of the entire mixture from which the sample is taken. Samples shall be taken from a haul unit and shall have the top foot of material removed. A scoop shall be forced vertically downward and into the material and the sample removed so as to keep all material in the scoop as it is lifted out.

D. EQUIPMENT

The following equipment is required for bituminous concrete plant mix sampling and Marshall specimen preparation.

1. Specimen mold assembly (3 sets)
2. Mechanical compaction hammer
3. Specimen extruder
4. Paper discs
5. Oven
6. Small capacity scale
7. Pans
8. Scoop, spoons and spatula
9. Trowel
10. Thermometers (2)
11. Insulated gloves
12. Marking crayons

E. TEST PROCEDURE

Three Marshall plugs and two Rice (loose mix) specimens shall be prepared from each sample.

1. Heat three mold assemblies to a temperature range of 275-300°F in the oven.

2. Obtain representative mix sample from the haul unit.

3. Obtain a hot bin or composite aggregate sample, depending on plant type, from the same batch (or within the same haul unit load).

4. Weigh out approximately 1200 grams of plant mix material from the obtained sample.

5. Remove one mold assembly from the oven and place paper disc inside mold assembly.

6. Place entire weighed out sample (1200± grams) into mold assembly. Spade the mold 25 times with a hot spatula, 15 times around the perimeter and ten times over the center. Remove collar and smooth surface to a slightly rounded shape.

7. Place mold assembly with sample onto compaction hammer pedestal. Check temperature of the mix sample as follows: Insert one thermometer in center of mold and the other 1/4" from edge. Average the temperatures and compact when the average is within the following target range:

85/100 Pen. or AC 15	270°F ±5°
AC 20	275°F ±5°

If the mix temperature is below those limits listed above, the mix sample shall not be compacted. The mix sample may be used for preparing a loose (uncompacted) mix sample for Rice testing (see below).

8. If the mix is within the target temperature range, place a second paper disc on top of sample. Place mold assembly onto hammer pedestal.

9. Compact each side of the specimen with 50 blows of the compaction hammer.

10. Upon completion of the compaction effort, the paper discs shall be removed from each side of the compacted specimen.

11. Repeat steps 4-10 for the remaining two compacted specimens.

12. Allow the compacted specimens to cool in air to room temperature.

13. Extract the compacted specimens from the molds with the use of the specimen extractor.

14. Identify each specimen for further testing (using marking crayon or similar method).

15. Two specimens of loose mix should be prepared from the same sample. For the preparation of each loose (uncompacted) plant mix specimen, weigh out approximately 1200 grams of plant mix material (or recommended quantity for the vessel used).

16. Place material in a large, flat pan and allow to cool.

17. Cooled specimens should be placed in bags (one specimen per bag) and identified.

18. Determine hot bin gradation as outlined in Appendix C or composite aggregate gradation as outlined in Appendix D.

19. Compacted and loose specimens will be transported to the Region Materials laboratory for testing as per Regional Materials Engineer direction.

F. REPORT

The aggregate gradation data, bituminous concrete plant information, and mix information are entered on the Marshall Mix Sample Results Plant Data form (BR-353).

BR-353 (1/87)

MARSHALL MIX SAMPLE RESULTS
PLANT DATA

DATE _____

PLANT NAME _____ FACILITY NO. _____ REGION ____

PLANT LOCATION _____ INSPECTOR _____

___ BATCH PLANT ___ DRUM MIX PLANT

SURGE OR STORAGE BIN USED ___ YES ___ NO BAG HOUSE ___ YES ___ NO

BAG HOUSE FINES RETURNED BY:

____ HOT ELEVATOR TO FINE BIN ____ CONTROLLED MINERAL FILLER SYSTEM

MIX TYPE: _____ FORMULA NO: _____

COARSE AGGREGATE SOURCE(S): _____

FINE AGGREGATE SOURCE(S): _____

ASPHALT CEMENT GRADE: ___ 85/100 ___ 15 ___ 20

ASPHALT CEMENT CONTENT: _____% SAMPLE DATE: _____

MIX TEMPERATURE: _____°F SAMPLE TIME: _____

CONTRACT(S) SUPPLIED: _____ EST. DAILY PRODUCTION: _____

AGGREGATE GRADATION DATA
(Hot Bin or Composite)

	% Passing							
	1	1/2	1/4	1/8	20	40	80	200
Actual								
Target Values								

LAB DATA

TESTED BY: _____ DATE: _____

	Bulk Specific Gravity (Gmb)	Maximum Theoretical Specific Gravity (Gmm)	Air Voids	Corrected Stability	Flow
Specimen #1:					
Specimen #2:					
Specimen #3:					
Average					
Design (Optional)					

Optimum Asphalt Cement: ____%

Mix Design Approval Status: ___ Full ___ Tentative

FIGURE J-1

Distribution: One copy Materials Bureau

APPENDIX K

SAMPLING OF ASPHALT CEMENT

A. SCOPE

This method details the specific procedures for obtaining asphalt cement samples by the Plant Inspector at bituminous concrete plants.

B. GENERAL

Materials Method 8.1 entitled "Paving Grade Asphalt Cement - Quality Assurance" details the specific quality assurance procedures for paving grade asphalt cement intended for use in Department work. That portion of the Materials Method 8.1 included herein outlines the Plant Inspector's responsibilities pertaining to the sampling of asphalt cements.

C. SAMPLING FREQUENCY

The Plant Inspector shall obtain a minimum of two samples from each plant producing material for the Department on each day of production. This sampling frequency may be increased at the direction of the Regional Materials Engineer.

1. The first sample shall be obtained as soon as practical upon arrival at the plant.

2. The second sample shall be obtained at the approximate mid-point of the day's production period.

3. Only one, one-quart sample shall be taken at each sampling period. No duplicate samples shall be taken.

D. SAMPLING PROCEDURE

The asphalt cement sample shall be obtained from the Department approved sampling valve as detailed below:

1. The sample container shall be a new, clean one-quart metal double friction top can supplied by the Regional Materials Engineer.

2. Prior to obtaining the sample at least one gallon of asphalt cement must be drawn off through the valve. This material shall be discarded and not used for the sample.

   NOTE TO THE PLANT INSPECTOR: The drawing off (wasting) of at least one gallon of asphalt cement from the sampling valve before filling the sample container is absolutely essential. This insures that the sampling valve is cleaned out and that a truly representative sample from the storage tank is obtained.

3. Fill the sample container at least three-quarters full, directly from the sampling valve, always bearing in mind that the material is very hot and should be handled in an extremely safe manner.

E. SAMPLE IDENTIFICATION

Each sample container shall be identified with the following minimum information:

1. Plant Name and Location
2. Plant Number (necessary only when more than one plant is at the location)
3. Grade of Asphalt Cement
4. Date and Time of Sample
5. Name and Location of Primary Source*
6. Lot Number*

*The identification of the Lot Number and Name and Location of the Primary Source shall be as detailed on the BR-162, Certified Shipment Notice or the approved Bill of Lading Form, representing the most recent delivery to the storage tank prior to the time of sampling. An example of a completed BR-162 is illustrated in Figure K-1.

F. SAMPLE STORAGE AND SUBMISSION

1. The Plant Inspector shall prepare the sample for transmittal to the Materials Bureau as follows:

   a. Selects the first sample taken each week and one additional random sample taken from the second half of that weeks' production.

   b. Completes a Form BR-170, "Bitumen or Mix Sample" for each sample submitted. An example of a completed BR-170 is illustrated in Figure K-2.

   c. Transmits the package to the Materials Bureau by the most economical manner as directed by the Regional Materials Engineer.

2. The Plant Inspector stores all samples not submitted for testing in an area protected from the weather and sufficiently ventilated to avoid excessively high temperatures. These samples shall be stored until the end of the calendar year.

BR 162c (9/76)

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

BITUMINOUS MATERIAL CERTIFIED SHIPMENT NOTICE

If one transport supplies two or more projects, a separate BR 162c (9/76) is required for each project.
THIS FORM SHALL BE EXECUTED FOR ALL SHIPMENTS OF BITUMEN.

DEL. TKT. NO.		
18726		
ITEM	GRADE	% ADDITIVE
702-0500	AC-20	

PRIMARY SOURCE*	LOCATION (mailing address)	LOT NO. **
XYZ Petro Corp	Hamlet, NY	5

SUPPLIER (Present owner of material being shipped)	LOCATION (mailing address)

SHIPMENT DESTINATION	LOCATION (mailing address)
Samson Road Mix Co	Towne, NY

GAL. @ 60 F	SPEC. GRAVITY @ 60 F	VEHICLE NO.	CONTRACT NO.
5226	1.02	38421	

SHIPPED IN [X] BULK TRANSPORT [ ] BULK R.R. [ ] BULK BARGE [ ] BARRELS [ ] DISTRIBUTOR

Complete the following section for LINE BLENDED BITUMENS ONLY.

ITEM GRADE	PRIMARY SOURCE	LOCATION	LOT NO.	GALLONS @ 60 F	% TOTAL	SPEC. GRAVITY @ 60 F

The above indicated material has been tested and a CERTIFIED TEST REPORT, dated 10/27/86 indicating conformance with all requirements of applicable Department Specifications, is on file.

I HEREBY CERTIFY THAT THE ABOVE INFORMATION IS CORRECT TO THE BEST OF MY KNOWLEDGE.

Richard Ecreik — Authorized Signature (For Supplier)
Terminal Superintendent — Title
11/5/86 — Date

* PRIMARY SOURCE – Refinery, Line-Blend Plant, Emulsion Plant, or Intermediate Storage-Facility where BITUMEN is SAMPLED, TESTED, and CERTIFIED or RECERTIFIED.

** TEMPERATURE VISCOSITY CURVE (KINEMATIC)
One copy should be sent with the first shipment of each LOT of Bitumen made to any Mix Plant or Project. (Not required for Tars, Filler, Emulsions or Emulsion Bases).

DISTRIBUTION: WHITE – With Shipment YELLOW – Supplier PINK – To Region

FIGURE K-1

Form BR–170c (7/77)
NEW YORK STATE
DEPT. OF TRANSPORTATION
MATERIALS BUREAU

BITUMEN OR MIX SAMPLE

FOR LAB USE ONLY
TEST NO.
DATE REC'D.
SERIAL NO. 144900

SEE REVERSE SIDE FOR INSTRUCTIONS

PRIMARY SOURCE* XYZ PETRO CORP
LOCATION* HAMLET N.Y.

LOT. NO.*	ITEM NO.*†	GRADE TYPE*†	DATE SAMPLED*†	TIME SAMPLED*†
5	702-0500	AC-20	11/7/86	900 AM

SAMPLED BY*†	REGION NO.*†	JOB-MIX FORM. NO. †	TONS REPRESENTED †
J Bushey	12		

COMPLETE THIS SECTION FOR SAMPLES TAKEN AT BITUMINOUS CONCRETE PLANT.

NAME OF OWNER*† SAMSON READY MIX CO.
LOCATION*† TOWNE N.Y.
REMARKS: * FAC. NO. 30025

COMPLETE THIS SECTION FOR SAMPLES TAKEN AT PROJECT SITE.

NAME OF SUPPLIER*† LOCATION*†
CONT. OR HM NO.*† VEHICLE NO.*
STATION AND LANE*†
GALS. REP. AT 60° F.*

DISTRIBUTION – •Yellow to Region File •Pink to Inspector • White & Green to Materials Bureau within Sample Pkg. • White Card (Part #5) – Affix to Sample Container

COMPLETE FOR BITUMEN SAMPLE*
COMPLETE FOR MIX SAMPLE †
COMPLETE FOR EITHER TYPE OF SAMPLE *†

FIGURE K-2